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The Gender Dimension of AI Ethics: A Bibliometric Analysis.

Vidya M*
Dr. A. Hameed**

Abstract

Artificial Intelligence (AI) has rapidly become a transformative technology influencing decision-making processes across diverse sectors such as healthcare, education, governance, and employment. Despite its promise of objectivity and efficiency, growing evidence suggests that AI systems often reproduce and amplify existing social inequalities, particularly gender bias embedded in training data, algorithms, and institutional structures. These concerns have stimulated increasing scholarly attention toward AI ethics, emphasizing fairness, accountability, transparency, and the development of responsible artificial intelligence frameworks. Within this context, bibliometric analysis has emerged as a valuable methodological approach for systematically mapping the intellectual structure, research trends, and collaborative patterns within a given field. Data from the Web of Science database yielded 264 relevant publications between 2023 and 2026. Analysis indicates a notable increase in scholarly interest, from 2023 to 2026. The increasing appearance of keywords such as bias, ethics, and AI literacy reflects a growing awareness of the need for responsible AI adoption. Thematic evolution also suggests a shift in research focus following the emergence of generative AI tools like ChatGPT, moving from primarily technological development toward broader societal implications, including algorithmic fairness, user acceptance, and mental health considerations. Despite these advancements, several research gaps remain. While gender bias and ethical concerns are gaining attention, they are still emerging themes that require deeper empirical and interdisciplinary investigation. Future research should therefore focus on developing robust frameworks for ethical AI governance, addressing gender and social biases embedded in AI systems, and promoting AI literacy among users.

Keywords: AI, AI Ethics, Gender bias, Gender, Education Research, Generative AI, Responsible Artificial intelligence, Web of Science, VOS viewer, R studio, Biblioshiny

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Introduction

Artificial Intelligence (AI) has rapidly become a transformative technology influencing decision-making processes across diverse sectors such as healthcare, education, governance, and employment. Despite its promise of objectivity and efficiency, growing evidence suggests that AI systems often reproduce and amplify existing social inequalities, particularly gender bias embedded in training data, algorithms, and institutional structures (Shrestha & Das, 2022; Buslón et al., 2023). Gender bias in AI may manifest in various forms, including discriminatory hiring algorithms, biased facial recognition systems, and stereotypical outputs generated by language models, thereby reinforcing historical patterns of gender inequality (Çırtlık & Cosar, 2024; Pop et al., 2025). These concerns have stimulated increasing scholarly attention toward AI ethics, emphasizing fairness, accountability, transparency, and the development of responsible artificial intelligence frameworks (de Lima et al., 2023; Buslón et al., 2023). Within this context, bibliometric analysis has emerged as a valuable methodological approach for systematically mapping the intellectual structure, research trends, and collaborative patterns within a given field. By examining publication outputs, citation networks, and thematic developments, bibliometric studies provide insights into the evolution of research and identify emerging directions in the discourse surrounding ethical and gender-inclusive AI. Therefore, the present study conducts a bibliometric analysis to explore the gender dimension of AI ethics, focusing on scholarly contributions addressing bias, fairness, and responsible AI development.

In light of these definitions, this study presents a bibliometric mapping of scholarly publications on Responsible Artificial Intelligence in the Web of Science database.

It addresses key *Research Questions*:

- What are the annual growth rates in Responsible Artificial Intelligence?
- Which authors dominate output in this field?
- What are the primary keyword and their evolution over time?
- What thematic shifts occurred post-ChatGPT (2022+)?
- What research gaps emerge and what future directions suggest?

Methodology

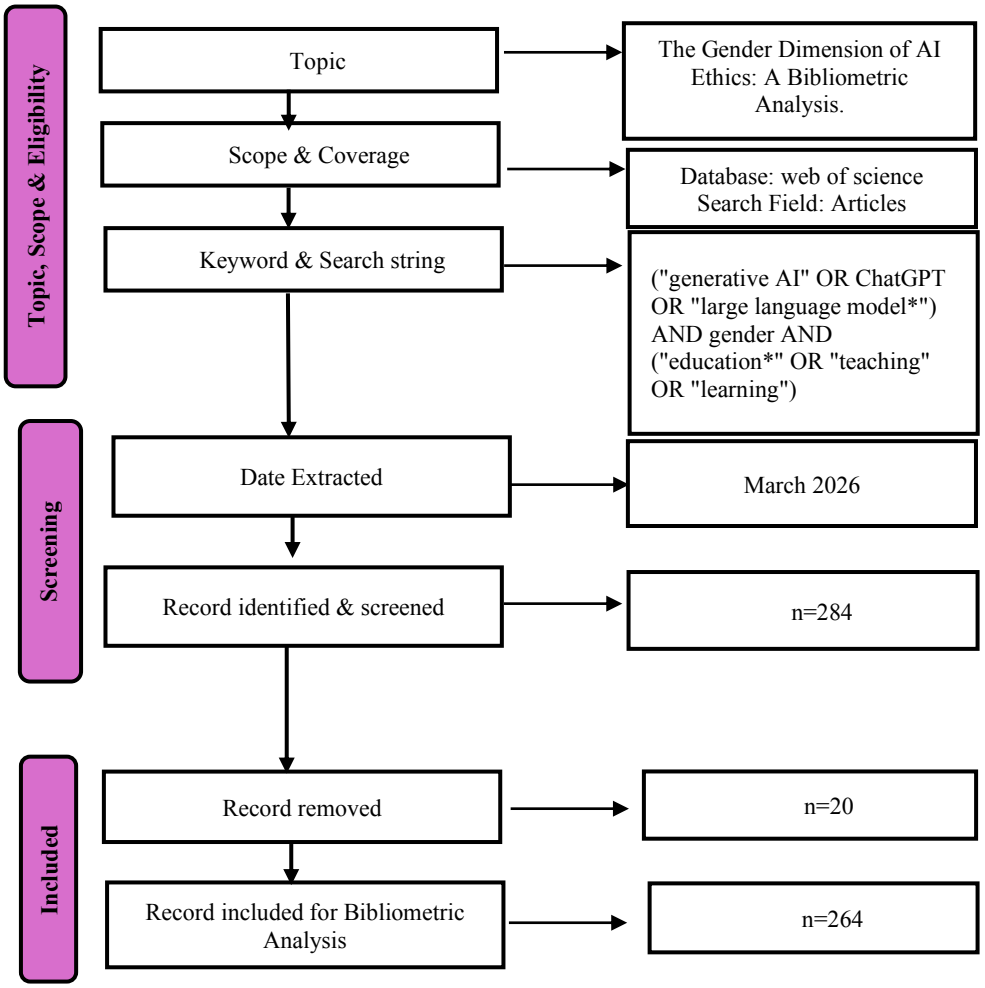
This research analysed Studies related to Gender Bias and Responsible Artificial Intelligence, through the utilisation of bibliometric analysis methodology. Bibliometrics is a valuable scientific tool extensively employed in diverse disciplines (Zhai et al., 2023).

Data Source and Search Strategy

The article searching and data collection, conducted in March 2026, utilised Web of Science, a widely established and comprehensive database for bibliometric analysis (Mongeon & Paul-Hus, 2016). This process involved three sequential phases: Defining the topic, scope, and eligibility criteria; Screening the articles; and including them, as depicted in Figure 1. The preliminary search string targeted articles on Responsible Artificial Intelligence, employing the relevant keywords outlined in Figure 1.

Figure 1

The Search Strategy Flow Diagram: Adapted from Zakaria et al. (2021)



Study Selection and Data Management

The articles identified from the initial search strategy included 284. In this regard, following the initial screening phase of the search results, the researcher refined based on language as English and Articles only. At the end of this phase, 264 articles were identified and deemed suitable for further analysis using Bibliometric techniques. The final data of the 264 articles from Web of Science database was then extracted in plain text format. This dataset included keywords, citations, abstracts, and bibliographic etc. Subsequently, this information was transferred to VOS viewer 1.6.20, a free software application with a user-friendly graphical interface for text analysis and network visualisation (Van Eck & Waltman, 2010) and R Studio & Biblioshiny for further analysis.

Data Analysis

Initially, analysis was conducted on the co-occurrence of keywords. This exploration involved the entirety of the collected data from Web of science, which was exported into VOS viewer for deep insights. the network visualisations on co-occurrence of keywords networks were developed using VOS viewer 1.6.20.

The subsequent results have been obtained based on the research objectives. The findings of the study are displayed in Figures.

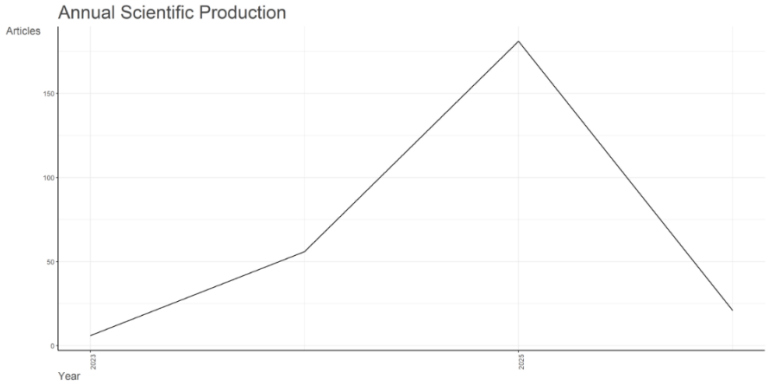
Bibliometric Findings and Discussion

Distribution of Publications over the Years

The study examined the distribution of studies in the Web of science database. The studies published between 2023and 2026 is only available in web of science related to given keywords. The outcomes of this study are presented in Figure 2.

Figure 2

Distribution of Publications by Years



The graph illustrates the annual scientific production of articles over the observed period (2023–2026) were created using biblioshiny. There are 4 stages:

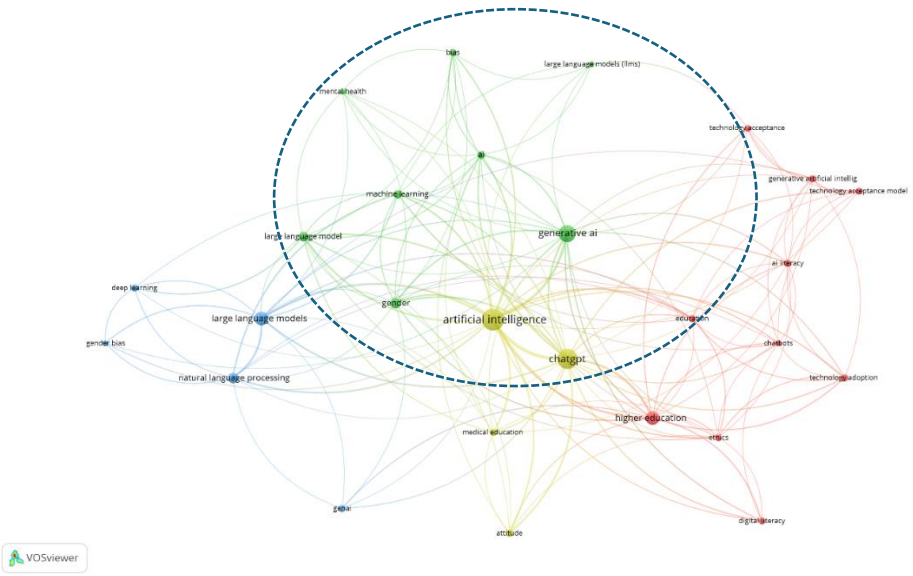
- Initial stage (2023)
- Moderate growth (2024)
- Peak research activity (2025)
- Sharp Decline (2026)

The number of publications shows a gradual increase from 2023 to 2024, indicating the growing scholarly interest in the field. A substantial surge in research output is observed in 2025, which records the highest number of publications, reflecting the period of peak academic engagement and intensified research activity. However, a sharp decline is visible in 2026, which may be attributed to the incomplete indexing of recent publications or the limited coverage of the database for the most recent year. Overall, the trend suggests that the field experienced rapid expansion and heightened scholarly attention during the mid-period, highlighting its emerging significance within the academic community.

Co-occurrence Keyword Network Analysis

Figure 4

Network of Co-occurrence Among Keywords



The figure 4 represents a Network of Co-occurrence Among Keywords generated using VOS viewer 1.6.20. Each node represents a keyword, the size of the node indicates its frequency of occurrence, and the links represent co-occurrence relationships between keywords. Nodes that frequently appear together in publications are placed closer, forming clusters that indicate major research themes.

The network is centred around "artificial intelligence" and "ChatGPT," which appear as the largest and most interconnected nodes. Their central position indicates that they function as core concepts linking multiple research themes. The network is organized into four major thematic clusters, each representing a distinct research direction.

Artificial Intelligence and ChatGPT Applications (Yellow Cluster)

Overall, this cluster reflects research investigating how AI tools, especially ChatGPT, are integrated into learning environments and how users respond to them.

AI in Education and Technology Adoption (Red Cluster)

This cluster indicates that a significant portion of research is dedicated to understanding how AI tools are implemented in educational systems and how users adopt them. The inclusion of technology acceptance model (TAM) suggests that many studies rely on established theoretical frameworks to analyse student's and educator's acceptance of AI-based technologies.

Additionally, the presence of ethics and AI literacy highlights increasing concerns about responsible AI use, ethical implications, and the need for users to develop competencies for interacting with AI systems. Thus, this cluster represents the pedagogical, ethical, and technological integration of AI in education.

Generative AI and Machine Learning Research (Green Cluster)

This cluster highlights research focusing on the development and functioning of AI technologies, particularly generative models. The presence of bias and gender indicates growing scholarly interest in algorithmic fairness and ethical concerns related to AI systems. Furthermore, the connection with mental health suggests emerging interdisciplinary research exploring how AI technologies interact with psychological or well-being related domains.

Overall, this cluster reflects the technical foundation of AI research along with emerging concerns about bias and societal implications.

Natural Language Processing and Deep Learning (Blue Cluster)

This cluster represents the computational and methodological backbone of AI technologies, particularly those that enable conversational AI systems like ChatGPT.

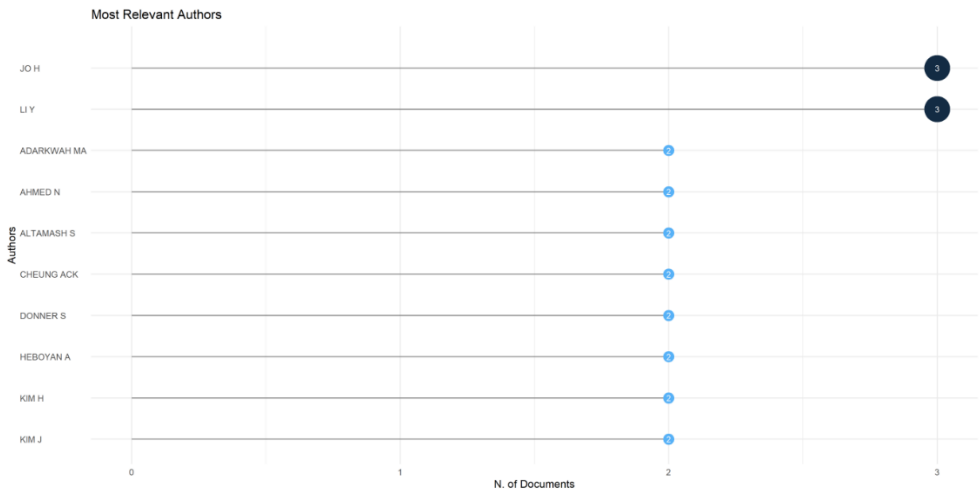
The presence of deep learning and NLP indicates that many studies focus on the underlying algorithms and architectures that power AI language systems. Meanwhile, the inclusion of gender bias suggests increasing attention to fairness and bias in language models, reflecting concerns about how AI systems may reproduce societal inequalities. This cluster therefore highlights language models, algorithmic performance bias and ethics connect technical and societal perspectives of AI.

Gender and gender bias is represented in both blue and green clusters. we can understand that ethical issues, bias, and responsible AI adoption are the Emerging concerns in this field.

Analysis of Most Relevant Authors

Figure 5

Most Relevant Authors



The Figure 5 represents the authors who have contributed the highest number of publications within the selected dataset, it highlights the core authors shaping the literature and helps identify influential contributors who are actively advancing research within the domain.

The horizontal axis represents the number of documents, while the vertical axis lists the authors. The visualization shows that Jo H and Li Y are the most productive authors and may be considered key contributors to this research area. Several other authors also have contributed.

Overall, the distribution suggests that the research area is moderately dispersed among multiple contributors, with only a small difference in productivity between the leading

authors and the rest. This pattern indicates that the field is collaborative and developing, with several researchers contributing relatively similar levels of scholarly output rather than being dominated by a single author.

Analysis of Trend Topics

Figure 6

Trend Topics



The Trend Topics graph illustrates the evolution and frequency of key terms appearing in the literature over time, highlighting emerging and dominant research themes within the dataset.

The visualization indicates that Artificial Intelligence and ChatGPT are the most recent and prominent trending topics, appearing toward the latest year on the timeline with relatively large node sizes. The larger circles represent higher term frequency, suggesting that these concepts have gained substantial scholarly attention in the most recent publications. This reflects the rapid integration of AI technologies and generative AI tools such as ChatGPT into academic discussions and research domains.

Another notable term is gender, which appears in the recent period as well. Although its frequency is comparatively smaller than AI-related terms, its presence indicates a growing interest in examining gender-related perspectives within technology or educational research contexts.

Earlier topics such as machine learning, deep learning, and impact appear toward the beginning of the timeline. Their smaller nodes and earlier placement suggest that these concepts were foundational themes in earlier years, forming the technological and conceptual basis for later discussions about artificial intelligence applications.

Overall, the trend analysis reveals a shift in research focus over time. Initially, the literature concentrated on core computational technologies such as machine learning and deep learning. In recent years, however, the focus has transitioned toward applied and emerging AI tools, particularly ChatGPT and broader artificial intelligence discussions, alongside social considerations such as gender.

For a bibliometric study, this pattern suggests that the research field is rapidly evolving from foundational AI methodologies toward practical implementations and societal implications of AI technologies. This indicates growing interdisciplinary engagement and highlights the increasing relevance of AI-driven tools in contemporary research.

Conclusion

The present bibliometric analysis provides a comprehensive overview of the intellectual structure and evolving trends in research on responsible artificial intelligence, with particular attention to ethical concerns and gender bias. The annual publication trend demonstrates a steady increase in research output from 2023 to 2024, followed by a significant surge in 2025, indicating heightened scholarly engagement and the rapid expansion of interest in this field. The apparent decline in 2026 can largely be attributed to the incomplete indexing of recent publications rather than an actual reduction in research activity. Overall, the growth pattern reflects the emerging importance of responsible AI within the academic community, particularly in the context of the rapid diffusion of generative AI technologies after the release of ChatGPT in 2022.

The analysis of authorship patterns reveals that the research landscape is relatively distributed, with no single scholar dominating the field. Instead, multiple researchers contribute comparable levels of output, suggesting a collaborative and evolving research domain. Keyword co-occurrence and thematic clustering further highlight the interdisciplinary nature of the field. Four major thematic clusters were identified: AI applications in education and ChatGPT integration, technology adoption and AI literacy, generative AI and machine learning development, and natural language processing with deep learning. Together, these clusters illustrate the transition of research from foundational computational techniques toward applied, pedagogical, and ethical considerations of AI technologies.

Importantly, the presence of gender bias and ethical concerns within both the technical clusters (green and blue) indicates that issues of fairness, responsibility, and societal impact are becoming integral to mainstream AI research. The increasing appearance of keywords such as bias, ethics, and AI literacy reflects a growing awareness of the need for responsible AI adoption. Thematic evolution also suggests a shift in research focus following the emergence of generative AI tools like ChatGPT, moving from primarily

technological development toward broader societal implications, including algorithmic fairness, user acceptance, and mental health considerations.

Despite these advancements, several research gaps remain. While gender bias and ethical concerns are gaining attention, they are still emerging themes that require deeper empirical and interdisciplinary investigation. Future research should therefore focus on developing robust frameworks for ethical AI governance, addressing gender and social biases embedded in AI systems, and promoting AI literacy among users

Recommendations

The study suggests that other researchers can use these findings to create scientific publications about the prospective applications of Responsible Artificial Intelligence. Furthermore, there is room for further research on this topic to enhance bibliometric mapping in the field. This can be achieved by incorporating more sources and databases, utilising other bibliometric analysis software like BibExcel, CiteSpace, and HistCite, and exploring other writing formats such as proceedings, review papers, and book chapters.

Limitations

The present study has some limitations. The study summarised published studies on Responsible Artificial Intelligence from 2023 to 2026, using data sourced primarily from the web of science database as of march 2026, and focused exclusively on English journals. Notably, this analysis excluded post-date publications and journals in other languages, possibly leading to minor variations. Additionally, it did not include papers, books and book chapters in the field, which suggests future research opportunities.

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Rethinking Value Education in the Context of AI and Digital Advancements: A Conceptual Framework

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Mohd Hassan**
Dr. Aerum khan***

Abstract

Artificial Intelligence and other digital technologies are quickly entering our educational spaces. The increased use of AI and digital technologies will lead to significant changes to: teaching and learning practices; learning programs; curriculum design; learning evaluation methods; student self-image. While the integration has presented the education sector with unprecedented opportunities of individualization, access and efficacy, it has also foregrounded the ethical, social and moral considerations as an imperative to redefine value education. Data confidentiality, algorithmic discrimination, cheating, addiction, and 'loss of empathy' as challenges can be viewed within the context of value education (Floridi, as cited in Selwyn 2022, & al., 2021).This conceptual paper proposes the redefinition of value education as the inseparable, experiential and context embedded practice within AI- enabled learning environments. Drawing upon existing, the most recent, Scopus indexed, open-access literature (2020-2025), this paper sets out to offer a conceptual model on technology context, educational context, mediators (digital citizenship, AI literacy, Ethics), pedagogical practices and learning outcomes. In the context of contemporary curriculum reforms (UNESCO, 2021; OECD, 2023), the paper discusses the implications for curricula design, teachers' training and policy making and concludes by positing that

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humanizing the technology through value education is imperative for a sustainable, ethical and responsive education.

Keywords: Value education, Artificial intelligence in education, Digital citizenship, Ethical AI, Teacher education, Digital pedagogy

Introduction

Education systems across the world are experiencing profound transformation due to the integration of Artificial Intelligence (AI), learning analytics, adaptive learning platforms, and generative technologies. AI-enabled tools now support personalized learning pathways, automated feedback, predictive analytics, and intelligent tutoring systems, offering new possibilities for enhancing learning efficiency and inclusivity (Kamalov et al., 2023; Zawacki-Richter et al., 2023). At the same time, the rapid adoption of such technologies has raised serious ethical, moral, and social concerns that challenge the traditional purposes of education (Holmes & Tuomi, 2022; UNESCO, 2023).

Historically, education has been regarded as a mechanism for cultivating both intellectual capacities and personal-moral and civic attributes. However, a significant portion of technology-driven adjustments focuses primarily on performance, scalability, and measurable indicators, often neglecting value-based instruction. This disparity becomes especially critical in electronic learning contexts where students' ethics, assumptions, and conduct are increasingly shaped by automated algorithms, virtual networks, and simulated environments. Furthermore, this shift occurs as human discretion increasingly defers essential choices and access to knowledge to automated technologies, introducing the risk of reducing human dignity, ethics, and moral involvement.. Education has been understood as a process of developing both intellectual as well as personal-moral and civic qualities. Yet, many of the tech-centric reforms are primarily concerned with efficacy, scale and outcome measures at the expense of value education (Selwyn, 2022). This imbalance is particularly problematic in digital learning environments when students' values, beliefs and behaviours are the products of algorithmic-driven systems, social networks and virtual worlds (Williamson & Eynon, 2020); when human judgment is increasingly delegating critical decisions, access to information to technology, and potential to diminish human worth, morality and moral engagement (Floridi et al., 2021).

To-date, though conversations surrounding AI in education are plentiful in academia, there were relatively few attempts to formulate ways to meaningfully integrate values education in an AI-leveraged education. Following this trend, this paper aims to propose a framework that connects the technological and pedagogical context with digital citizenship, AI literacy, and education about ethics of AI technology. This paper addresses the following questions:

1. What constraints hinder traditional value education models in AI-enabled learning?
2. How can values education be conceptually linked to AI literacy and digital citizenship?
3. What pedagogical and policy implications emerge from such an integrated framework? (UNESCO, 2023; OECD, 2023).

Therefore, value education must be reimagined to address the realities of digital life. Rather than treating values as a separate moral subject, they must be integrated into digital pedagogy, AI literacy and curriculum practices. This paper seeks to conceptualise such integration and proposes a framework for embedding value education in AI-enabled learning environments.

Value Education: Conceptual Foundations and Contemporary Relevance

Value education refers to the systematic cultivation of moral, social, civic, cultural, and ethical values that enable individuals to live responsibly in society. The traditional value education techniques focused on character building, moral stories, civic education and community life involvement. In fact, these methods stemmed from community, family, and school interactions and relationships.

Value has become more and more mediated by technology in the digital age. Recommendation algorithms, social networks, AI systems and online platforms influence the learner's choice, attitudes and interactions (Selwyn, 2022). Hence, value education in the contemporary world needs the attention of new trends on digital behaviour, ethics in virtual environments and safe and responsible use of technology. This broadening definition is in line with the digital citizenship definitions that include responsibility, respect for difference, online safety and citizenship (Tadlaoui-Brahmi et al., 2022; Choi et al., 2021). Besides, AI is beginning to question the moral limits. Nowadays students are dealing with systems capable of producing, assessing and recommending, sometimes without transparency, calling for deeper ethical scrutiny and critical awareness (Floridi et al. 2021; UNESCO, 2023).

The approaches taken towards value education in the past mainly catered for settings which was face-to-face teaching where families, communities and families play key roles in forming qualities like morality and personalization for a child. Yet, the quick deployment of AI, learning analytics and digital platforms has quickly changed where learners' value development and moral reasoning takes place. In digital environments, students are immersed in algorithmically presented and AI-created contents, online communities and online interactions which shapes attitudes, behaviours and decisions

(Williamson & Eynon, 2020; Zawacki-Richter et al., 2023). Therefore, direct moral education, as well as the role of transmission from teachers in classrooms cannot equip learners to respond to the data privacy, misinformation, algorithmic bias, academic dishonesty and AI ethics, etc., but rather, value education of the 21st century should be an interdisciplinary, experiential, and digitally informed process with the fusion of digital citizenship and AI literacy where learners develop critical reflection towards new technology while maintaining empathy, responsibility and ethically minded behaviours within a digital space (Choi et al., 2021; Long & Magerko, 2020; UNESCO, 2021).

Artificial Intelligence in Education: Opportunities and Ethical Challenges

Opportunities of AI in Education

AI offers numerous benefits in education, including personalized learning, real-time feedback, intelligent tutoring, accessibility for learners with disabilities, and data-informed instructional decisions (Kamalov et al., 2023; Holmes et al., 2022). Generative AI tools can support writing, problem-solving, simulation, and creativity, enabling learners to explore concepts deeply (Zawacki-Richter et al., 2023). From a pedagogical perspective, AI has the potential to free teachers from routine tasks, allowing them to focus on mentoring, emotional support, and higher-order learning.

Ethical and Moral Concerns

Despite its potential, AI also raises ethical dilemmas that directly impact value formation. These include data privacy and surveillance, algorithmic bias, academic integrity, and the erosion of empathy through over-automation (Floridi et al., 2021; Selwyn, 2022). Recent systematic reviews stress that education systems must adopt human-cantered AI principles—fairness, transparency, accountability, and inclusivity—to mitigate these risks (Fu & Weng, 2024; OECD, 2023). These concerns underscore the urgent need to integrate value education within AI-driven learning environments.

Digital Citizenship, AI Literacy, and Ethical Reasoning

Digital Citizenship as Value Education

Digital citizenship encompasses responsible, ethical, and participatory behaviour in digital environments. It includes respect for others, ethical communication, privacy protection, and civic engagement (Choi et al., 2021). Research shows that digital citizenship education improves students' online behaviour, empathy, and social responsibility (Tadlaoui-Brahmi et al., 2022; Jones & Mitchell, 2022). However, scholars caution that digital citizenship must be grounded in moral reasoning rather than technical compliance alone (Ribble, 2023).

AI Literacy and Ethical Awareness

AI literacy extends beyond technical skills to include understanding how AI systems work, recognizing bias, evaluating outputs, and reflecting on ethical implications (Ng et al., 2021; Long & Magerko, 2020). Recent research emphasizes that ethical engagement should be a core dimension of AI literacy, particularly in school education (Kong et al., 2024). Integrating AI literacy within value education empowers learners to interact with AI responsibly rather than passively consuming algorithmic outputs.

Moral Reasoning in Digital Contexts

AI cannot replace human judgment. Therefore, value education must strengthen learners' moral reasoning skills so they can evaluate information critically, make ethical decisions, and resist manipulative or biased digital content (Floridi et al., 2021). Ethical case studies, simulations, and reflective discussions are effective pedagogical strategies for fostering such reasoning.

Conceptual Framework for Integrating Value Education with AI and Digital Pedagogy

This study proposes a conceptual framework-an integration of recent trends on value education, digital citizenship, AI literacy and ethics education-to show the pathway of systematically inculcating ethical competencies in an AI-infused education system. The theoretical construct of conceptual framework is used to organize and depict the relationship among the basic constructs in the theory as a guideline for education research and practice (Jabareen, 2009). To the extent of which a growing trend in AI adoption in education requires more comprehensive ethical, social, and pedagogical frameworks, beyond technological solutions (Holmes & Tuomi, 2022; Zawacki-Richter et al., 2023), the present paper builds conceptual constructs of value education, digital citizenship, AI literacy, and ethics education as overlapping and interlocking constructs rather than stand-alone competencies. Value education provides essential grounding for fairness, empathy, accountability, and socially responsible technology use (Floridi et al., 2021).

Digital citizenship supports learners' ethical conduct in digital environments (Choi et al., 2021) and AI literacy helps develop learners' capacity to analyse and critique intelligibility, intelligibility processes and intelligent algorithms in AI systems (Long & Magerko, 2020; Ng et al., 2021). Furthermore, the framework conceptualizes that these competencies act as mediating factors linking technological innovation to the learning and teaching outcomes via reflective pedagogical practice, collaborative learning, and meaningful ethical practice (Fu & Weng, 2024; Kong et al., 2024). This will serve as an overall conceptual blueprint for curriculum designers, teacher educators, researchers and

policymakers who aim to humanize AI-supported education and cultivate responsible, ethical and critically aware citizenry in a digitally mediated society (OECD, 2023; Tondeur et al., 2023; UNESCO, 2023).

Inputs

- Technological context: AI tools, platforms, data systems, digital infrastructure
- Educational context: Curriculum, teacher capacity, institutional culture, policy frameworks

Mediators

- Digital citizenship (ethical online behaviour, digital rights)
- AI literacy (critical and ethical engagement)
- Ethics education (empathy, moral reasoning, social responsibility)

Pedagogical Processes

- Experiential and project-based learning
- Collaborative problem-solving
- Reflective practices (journals, ethical debates)
- Authentic assessment of ethical reasoning

Outcomes

- Ethical and responsible use of AI
- Strengthened empathy and social values
- Enhanced critical moral judgment
- Development of socially responsible digital citizens

The framework emphasises feedback loops enabling continuous curriculum and policy improvement (UNESCO, 2021).

Figure 1

Conceptual Framework: Integrating Value Education with AI and Digital Pedagogy

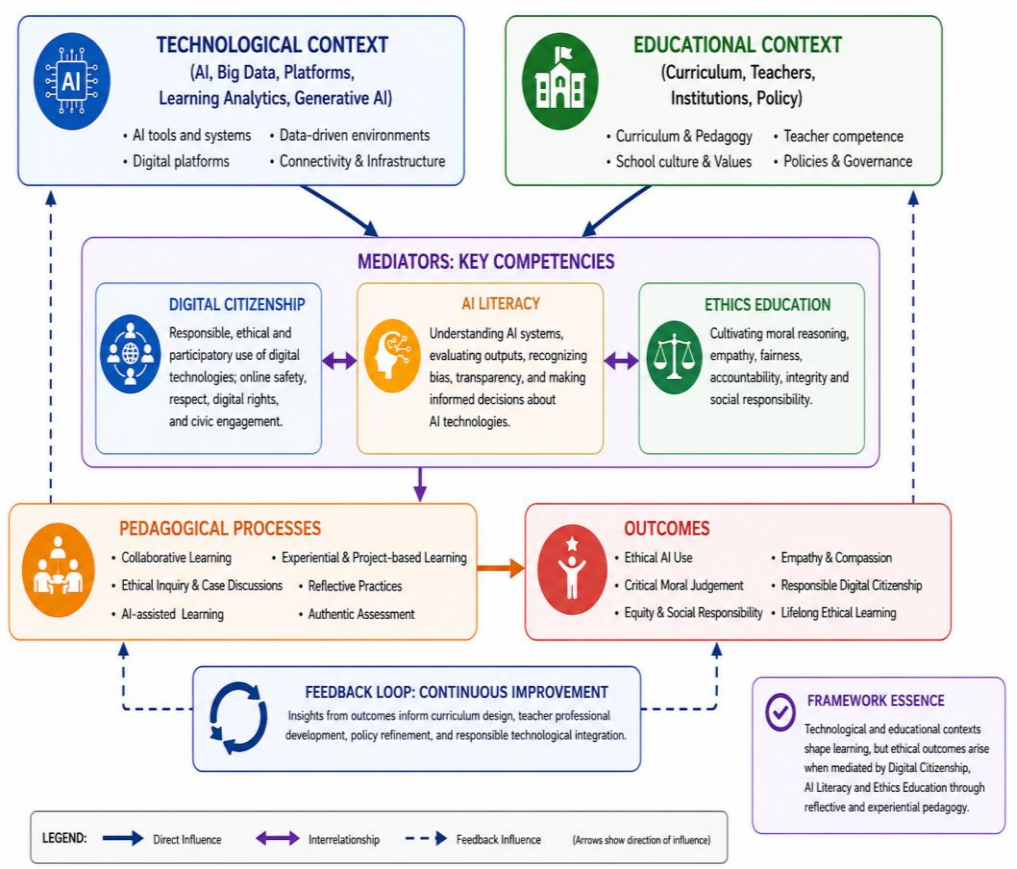

Figure1 shows a model that describes the dynamic relationship between education and technology, mediated competencies, curriculum activities, and how the students eventually learn. The two contexts-technology infrastructure and organizational learning environments- are assumed to be the necessary conditions for learning to take place, but they alone do not result in students' ethical usage of the technology. Three mediating competencies- Digital Citizenship, AI Literacy and Ethics education-interact with one another, creating the synergy in learning with AI technologies responsibly and ethically.

In the model, these competencies support effective pedagogical activities such as collaboration, experiential learning, reflection, and genuine assessment that, in turn, help cultivate students' ethical engagement with AI, moral reasoning, empathy and civic mindedness within the digital realm.

Finally, the feedback loop is in the diagram suggesting curriculum evolution and policy adjustment due to learning with new technology and the educational experiences of learners and instructors.

Mediators

The proposed framework outlines the ways the competencies in the domain of Digital citizenship, AI literacy and ethics Education can be considered the principal mediator which connects these two levels: from the Technological and education context level, to the ethical outcomes level. Digital Citizenship: This competency encompasses learners' knowledge, skills and predispositions which enable them to participate in digital spaces in a safe, responsible and democratic manner, by respecting the rights and the well-being of others (Choi et al., 2021; Jones & Mitchell, 2022). AI Literacy: This competency includes learners' ability to understand how Artificial Intelligence (AI) works, to critically assess and respond to the results of AI algorithms and systems, to perceive the inherent biases in AI code, and make a deliberate choice on the application of technologies powered by AI (Long & Magerko, 2020; Ng et al., 2021).

Ethics education provides the normative scaffolding around moral decision making, compassion, fairness, responsibility and social awareness guiding the technology competence to be driven by human values rather than just efficiency (Floridi et al., 2021; UNESCO, 2023). The above three mediators were selected due to the recent literature that has robustly established these are complementary competencies needed to interact in the society where AI is used extensively in every domain. Understanding how technology works and digital awareness of citizens translate to becoming responsible digital beings through the practice of moral competencies that underpin technological actions and civic participation. This shift turns technical capability into ethical action, nurturing the learners of society who are responsible, reflective, critical and autonomous learners who function in human AI collaboration contexts (Kong et al., 2024; Holmes & Tuomi, 2022; OECD, 2023).

Interrelationship among the Mediators

In this conceptual framework, Digital Citizenship, AI Literacy, and Ethics Education are assumed to act as three intertwined mediators that jointly mediate the linkage between technological and pedagogical contexts and the ethical learning outcomes. It means one can teach to develop the ability of using technological knowledge for ethical actions and becoming critically aware and ethically responsible citizens of smart technology based digital societies (Kong et al., 2024; Fu & Weng, 2024; Tondeur et al., 2023). This perspective of interaction gives a crucial suggestion about the planned framework by

identifying value education as the bridge that can connect the technology innovation with a human oriented and sustainable education.

AI literacy enables the acquisition of the ability to understand AI mechanisms, to evaluate AI-generated content, to recognize AI bias and to adopt informed judgments with regard to the applications of intelligent technologies (Long & Magerko, 2020; Ng et al., 2021). Nonetheless, technological literacy does not guarantee ethical action, which is fostered through digital citizenship, by guiding the learner to enact their AI literacy competently, through respect, responsible engagement and protection of digital rights as well as civic engagement in digital spaces (Choi et al., 2021; Jones & Mitchell, 2022). Ultimately,, ethics education functions as the normative grounding, developing a sense of fairness, justice, empathy, accountability, and integrity which can then shape not only how the learners apply their understanding of and participation in AI-enabled digital spaces but also the reasoning and process through which this application is evaluated in light of social implications and value judgments (Floridi et al., 2021; UNESCO, 2023). In so doing, it provides the value system underlying the technological behaviours to be carried out.

The interaction between the three mediating variables provides a cohesive pathway to ethical learning outcomes where AI literacy explains the "how," digital citizenship explains the "acting," and ethics education explains the "why" related to intelligent technologies.

Thus it is possible to teach how to translate the acquisition of the technical capacity to ethical attitudes so that they promote the production of informed, responsible, and critical digitally engaged citizens in smart technology based digital societies (Kong et al., 2024; Fu & Weng, 2024; Tondeur et al., 2023). Such an interactional perspective presents a key insight on the proposed conceptual framework, by conceptualizing value education as the bridge that can connect technological innovation to a human-centred and sustainable education.

Implications for Curriculum Design

The curriculum should have a planned, consistent and coordinated approach to value education, by integrating it into various subjects rather than making it a dedicated subject. Concrete ethical challenges that arise in the use of AI, in data and in digital citizenship should not be a matter of separate disciplines (OECD, 2023).Assessment should move away from rote moral knowledge to assess ethical reasoning, collaboration and reflectiveness.

Implications for Teacher Education

The ethical mediation of the teacher will be of great significance in a world that is driven by AI. But research shows that teachers often do not feel confident in their ability to address ethical dilemmas that arise from digital technologies (Instefjord & Munthe, 2021; Tondeur et al., 2023).A connection between ethical AI literacy, value-oriented didactical approaches and reflective professional axes is thus to be established in teacher education.

Policy Implications and Alignment with Educational Reforms

The policies in education need to make digital transformation with value education explicit. There is an increasing focus on having a broader sense of development, an ethical sense and digital competence in national and international frameworks. For instance, current education policies call for responsible technology usage, social-emotional learning and human-cantered AI in education. AI use requires ethical guidelines, practices need to be transparent, and stakeholders should be part of the decision-making process. In its absence, value education may remain limited to mere symbolic changes, but not too radical changes.

Discussion

This study aimed to renew the concept of value education in the era of AI and digital technologies, by proposing an integrated model which supports the ethical, moral and civic values parallel to digital pedagogy. The conceptual arguments of the paper are discussed by connecting them with the research and educational policy direction in recent times, thereby focusing on the need for future modifications to value education based on the socio-technical experience in today's learning settings. The central ideas that have emerged from this paper are that the notion of value education in the digital era should shift the focus from the traditional Teaching, When Morals are Transmitted model to the Teaching, When Morals are Engaged model. Traditional methods of teaching values can be based on top-down standards and abstract values. But in an AI environment, learners have to deal with a constant flow of ethical questions, be it about data sharing, about questions of authorship of written content or about problems of algorithmic bias and online behaviour, which cannot be resolved by the mere transmission of moral teaching. Literature in contemporary times has shown the need for readiness to ethical reasoning, not just having values (Ng et al., 2021; Fu & Weng, 2024). To address this need the proposed framework incorporates ethical dimensions into the concepts of digital citizenship, AI literacy and critical reflection as part of the teaching and learning processes. This change reflects the understanding that value education is no more an approach of imposing values from outside but should rather be

an active process and an experience, in which values, both old and new ones, are being negotiated with and shaped by oneself and one's peers.

One interesting implication of this framework is the way "Digital Citizenship," "AI Literacy" and "Ethics Education" are not autonomous fields of education, but rather go together and between one another as mediating competencies. Previous research has focused on individual constructs as in isolation - such as AI Literacy as a technical literacy (e.g., Ng et al. 2021), Digital Citizenship as a mode of legitimate civic engagement with the internet (e.g., Choi et al. 2021), and Ethics Education as the development of moral disposition (e.g., Floridi et al. 2021); yet, in this work we infer that the three constructs work together to support the ethical immersion of learners in AI-mediated educational learning spaces.

AI Literacy can prepare them with understanding and skills to look critically at algorithmic intelligence – its output, biases or unfairness (Long & Magerko, 2020); AI Literacy can enable them to make informed ethical decisions about how to use algorithmic intelligence and interact online – provide clear communication, defend rights, participate in the democratic process (efficiently or inefficiently), and so on (e.g. Jones & Mitchell, 2022); and even more fundamental, Ethics Education can provide them with a normative framework (principles of empathy, fairness, accountability, social concern) that underpins their approach to better technological intelligence and interactional integrity (e.g. UNESCO, 2023).

From here it should follow that the proposed framework is more than anything else the other recent ones in the scope of AI-in-education. Namely it will expand and reposition it from effective technology application towards education for ethical reasoning, social responsibility and critical perspective, recognizing Value education as the central enabler of AI in the creation of human centric and socially responsible transformation in education (e.g., Holmes & Tuomi, 2022; OECD, 2023; Fu and Weng 2024).

AI literacy is also presented as a moral competence and not only a skill, as it becomes an important consideration in ethically handling AI tools. However, recent literature and studies published in academic journals and indexed on Scopus, e.g., awareness and transparency (Kamalov et al., 2023) also highlight the importance of considering some ethical aspects of AI in education. Ethical issues are also found in the context of AI in education, with recent studies included in Scopus stressing the importance of human-cantered design and transparency (Kamalov et al.,., 2023). It connects AI literacy to value education by focusing on e.g., the ability to evaluate AI's outputs, increasing awareness of algorithmic bias, and the responsible use of generative tech. This integration is especially important given concerns around academic integrity and over-reliance on automation. Instead of passively relying on algorithms to make decisions for them,

teaching students how and why to use AI ethically empowers them to take responsibility and autonomy. AI literacy is therefore an essential part of civic and moral education in digital societies.

This recent systematic review confirms the idea that online education is positively affecting students' online behaviours, empathy and responsibility (Tadlaoui-Brahmi et al., 2022). Digital citizenship efforts are, however, often shallow, superficial, and skills oriented with less moral component. In this paper, digital citizenship is seen as a value education and is introduced as an essential element instead of an additional digital competence. The framework includes empathy, respect and social responsibility in the learning process, recognizing social, technological, cultural and affective implications that are still in the learning process, especially the potential reduction of human relationships in technology-mediated learning. This is especially relevant in the post-pandemic education environment, as learning through technology has become accepted in schools, but not always seen as being emotional for many of the learners.

The conversation also reaffirms the vital role of teachers as moral actors in the context of an AI-rich learning environment. AI-driven tools can assist in teaching but they can never represent moral judgment, empathy or sensitivity. Therefore, teachers will always be essential role models and facilitators of ethical conversations. Yet research indicates that digital technologies and AI present an ethical dilemma for many teachers that is uncomfortable. This creates an important area of concern within teacher training programmes not only in relation to the embedding of digital items but also because of the lack of training on ethics. What is important here is how teacher training programs often focus on digital items, with limited attention paid to ethics. The teaching methods and ethical AI literacy suggestions for value education proposed in this paper in teacher training follow the trend of AI technology and moral responsibility, which implies that it is important to train teachers who are technologically competent and have ethical responsibilities (Fu & Weng, 2024).

The discussion also situates the findings within broader educational policy contexts. Topics of technology responsibly, social-emotional learning and holistic development are growing areas of focus in global and national education reforms. But these goals are not consistently implemented at all institutions. The framework suggested in this paper provides a structured way for connecting policy ideals with classroom practice by linking curriculum, pedagogy, assessment, and teacher preparation with moral ideals. Moving from compliance driven digital adoption to models of 'ethical governance' which focus transparency, inclusion and accountability within the institution is essential. If not aligned systemically, value education may fail to make an impact rather than a transformative difference.

Contribution to Theory and Practice

The paper's central theoretical argument is that value education should be conceived as a mediational construction between pedagogy and technology, not a parallel or adjunct area of interest. In terms of practice, the proposed framework represents an agenda or blueprint for curriculum designers, educators and policy-makers to seamlessly and appropriately inject values in AI education; and as such, it highlights avenues for future research such as empirical verification, design-based interventions and cross-cultural inquiry to deepen understanding of digital value development and provide evidence-based digital educational practice.

Conclusion

The current and rapid growth of Artificial Intelligence and digital technologies have revolutionized the purpose, processes and possibilities of education. AI tools represent a promising way to enhance personalization, accessibility, and efficiency in education, but they also raise natural situations of deep ethical, social, and moral issues that need to be tackled in a new way. In this context, value subjects should not only be morality education or education based on value unit only, but it should be repackaged as a dynamic, integrated, and transformative learning model that is integrated into digital pedagogy.

Based on this paper, it is concluded that the way to rethink the concept of value education in such a way that it can be adapted to the digital era is to move beyond moral-formulation and moral instruction taught with a prescriptive approach, to moral opportunities within value construction, critical reflection and human-centred approach towards technological practice. The envisioned conceptualization outlines the relationships between the technological and educational contexts, the competencies in between (digital citizenship, AI literacy), and pedagogical processes, including ways of experiential and reflective learning as a result. The conceptual perspective envisioned emphasizes the interplay of the technological and the educational contexts, the competencies in between, such as digital citizenship and AI literacy, and the pedagogical processes, including experiential and reflective learning as a result. The framework includes various components that can be connected to other outcomes, such as ethical use of AI, empathy, and moral judgment, providing a comprehensive path toward embedding values in learning with AI.

It is also essential to note that AI cannot be a substitute for human judgment, moral thinking, or empathy, which are core aspects of teaching, a social and ethical endeavour. In this regard, the role of teachers stands even more importantly in technology equipped classrooms. Educationists should also be ethical mentors and facilitators of learning, helping students engage with complex online realities. This requires a significant change in the professional culture, teacher training and professional development program in

educational institutions, in such a way that educators also gain ethical AI knowledge and reflective competencies in pedagogy.

The paper recommends that policies in the transition to digitization should strive for convergence with the basic objectives of schooling from a policy standpoint. The integration of AI technologies in HEIs and schools must be accompanied by ethical guidelines and clear data governance, as well as inclusive decision-making frameworks. If it is not a systemic affair, it is just a symbolic rhetoric and would not be an educational reality.

Last, this study underscores the need to conduct future research that empirically studies the operationalization of value education in the AI-enabled classroom of various educational levels in various socio-cultural contexts. Longitudinal studies, design-based research and mixed methodologies might offer more detailed accounts of value-formation, value-negotiation, and value-sustaining in DL. In an increasingly automated society, education systems can make use of the potential of AI as an efficiency-enhancing resource by making sure to implement pedagogies that are ethical in purpose and execution, thereby helping to foster responsible, empathetic, and critically aware citizens.

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Balancing Learning and Cognitive Load: The Role of Microlearning in Educational Design

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Abstract

Microlearning is a global trend which aligns with the present generation's learning needs. The concept of microlearning has been repeatedly highlighted as a successful learning approach. It is an effective learning methodology that enhances learners cognitive process by managing cognitive load. The present study delves into an exploration of this new instructional approach of microlearning. In the beginning of the study the author explores the concept of microlearning, advantages and applications. Building on this the author examines the intersection of microlearning and cognitive load theory considering literature to find their relationship. By combining insights from research on microlearning and cognitive load, this paper seeks to explain how microlearning can be effectively applied to boost cognitive processing by managing cognitive load. Following this exploration the paper provides prospective avenues of microlearning. On understanding the relationship between microlearning practices and cognitive load educators can benefit with innovative instructional design to enhance learning experience in diverse contexts.

Keywords: Microlearning, Cognitive load, ADDIE, Cognitive load theory, instructional design

Introduction

Microlearning is a novel approach that will facilitate digitization in education and improves students interest in learning (Putri et al., 2024). One of the major characteristic of Gen Z learners is their short focus and change in information seeking – consuming behavior (Taylor & Hung, 2022). "Microlearning is defined as a concise method of delivering various types of learning activities within a brief time frame and with condensed content"(Wigati et al., 2023). These type of instruction provides bite sized

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information which varies in their format but can be quickly consumed with ease (De Gagne et al., 2019). Parallel terminology for microlearning include nano-learning, short-term learning, bite sized learning, chunks, bursts, short courses(Samala et al., 2023). With the large volume of materials learners can feel stressed and overwhelmed, microlearning seeks to address this issue of cognitive overload in learning (Kossen & Ooi, 2021). Microlearning is based on the theory that human brain processes information efficiently when it is given in fast and concise format (Samala et al., 2023). This article seeks to understand the concept of microlearning, examining its theoretical basis and also focusing on studies (Sachdeva & Hewitt, 2026) which have used microlearning to manage cognitive processing.

Understanding Microlearning

The theory contributing to microlearning is by George A Miller known as chunking according to which the human memory can only retain 5-9 chunks of information with each chunk representing a bite of information (Wigati et al., 2023). Microlearning includes short bites of information that are presented through various formats such as audio, video, image, text, podcast, infographics and screencast (De Gagne et al., 2019). In the recent years there has been many developments in the area of microlearning platforms. Many platforms emerged such as Coursmos, Grovo, TalentLMS are more focused towards microlearning (Jahnke et al., 2020).There are several components of microlearning that makes it different from traditional learning which is discussed in the following figure (De Gagne et al., 2019).

Table 1

Comparison of microlearning and microlearning (De Gagne et al., 2019)

Sl. No.	Aspect	Macrolearning	Microlearning
1.	Learning Context	Formal settings like classrooms	Occurs informally such as short learning moments
2.	Time spent	Several hours	Few seconds to minutes
3.	Content type	Learning modules with broad topics or ideas	Microcontent focussing on a learning idea
4.	Content structure	Learning materials need to be combined with other to make full sense	Each piece is standalone and makes sense on its own
5.	Learning process	Follows a structured step by step plan with different units combining various type of content	More flexible & learner driven. Learners find and organise content on the go.

Benefits and Challenges of microlearning

There are multiple benefits of microlearning. Microlearning helps in long term retention of knowledge by improving focus of the learners (Elias, 2022). Using this approach lessons can be completed in short duration by making customization in lessons to meet learners needs (Fitria, 2022). Microlearning creates engagement of learners as it includes information in small bites with more versatile presentation of the content (Elias, 2022). Another interesting potential of microlearning is its ability to grasp students' interest and to make students remember the concepts by packing it with short digital materials like animated videos, infographics etc. Low cost in development and maintenance of microlearning content (Elias, 2022). Another advantage of this method is the asynchronous mode in which it can be used so that the learners can control the time place and method through which they can access the information (De Gagne et al., 2019).

In developing microlearning content there are several challenges encountered. These include providing more information on small screen , no contact with the instructor , accessibility ,technical and affordability issues (Jahnke et al., 2020). Other challenges such as creating personalized training content, updating the content to ensure relevance with passage of time (Isibika et al., 2023).

Microlearning and cognitive load theory

Microlearning involves the 3M i.e. microcontent, micro media and micro knowledge which provides just in time learning with no sizeable cognitive load (Susiana et al., 2022). Thus the theory pertinent to microlearning is the Cognitive Load Theory (CLT) (Khong & Kabilan, 2022). Cognitivism focuses on inner mental activities of the learner and argues that learning is an information generating process. It focuses on managing the mental effort involved in the cognitive process. According to cognitive load theory there are three types of loads – Intrinsic, Extraneous and Germane load. Intrinsic cognitive load is associated with the interaction level of learning elements in a material given to learners, this is inherent and cannot be altered. (Paas & Van Merriënboer, 2020).Extraneous load includes all the insignificant information that can cause stress to the memory of the learners and germane load is associated with the mental effort that learners need to focus their attention to understand as well as retain the learning content (Curum & Khedo, 2021). The major aim of cognitive load theory is to optimize cognitive load and to enhance learning. For this instructional designer plays a role in minimizing the extraneous load by managing intrinsic load and promoting germane load (Plass et al., 2010). With regard to microlearning , by presenting information in bite sized format helps in reducing extraneous cognitive load (Balasundaram et al., 2024). Also according to Cognitive load theory features of microlearning such as micro content and content

retrieval helps learners to have long term memory of the information presented (De Gagne et al., 2019). The reduction in cognitive load will have a positive impact on learning such that the learners will be able to concentrate on more critical content with interest (Marti, 2023). Therefore, instructional designers can make use of microlearning strategies.

Cognitive-Enhanced Microlearning: An ADDIE Model Designed with Cognitive Load Theory Principles

The e-learning industry has faced several obstacles such as adapting to the needs of Gen Z learners who feel bored very easily as well as the load constraints of the human memory capacity and cognitive load theory (Safaruddin, 2023). In order to overcome these obstacles, the use of microlearning strategy is preferred. Thereby the author here addresses the microlearning content preparation based on ADDIE model of instructional design and practical strategies and key ideas from cognitive load theory (Clark, n.d.; Sweller et al., 2019). The ADDIE model consists of 5 stages including 1) Analyze: In this stage the needs of the learner will be identified 2) Design : In this stage the results of analysis will be used for designing a blueprint of the learning design 3)Development : This stage involve developing the blueprint to a product 4) Implementation : In this stage the product that is being created is implemented 5) Evaluation : This is the last stage in which the final learning product is assessed in order to understand its potential and shortcomings(Molenda, 2015). In designing a microlearning instruction according to the ADDIE model by considering the cognitive load theory principles the following are strategies to be included while designing each stage.

1. **Analyze:** According to the cognitive load theory principles the use of explicit instruction is favored. The analysis stage should include identifying learner characteristics and learning needs of the students (Hutauruk et al., 2021).Thus, considering Clark, (n.d.) work on tailoring instruction based on cognitive load theory the analyze stage of this design consists of understanding the prior knowledge of the learners and the complexity of the content. Thereby this can help in tailoring instruction according to the student's capacity for learning by adjusting the complexity of the task.
2. **Design:** Design tasks involve defining and establishing learning goals, developing effective learning strategies, selecting appropriate learning media, specifying desired learning outcomes, and creating assessments to evaluate the success of learning (Hutauruk et al., 2021).According to (Clark, n.d.), while designing the microlearning it should be ensured that Cognitive learning

strategies like worked example for new information, use of dual modality such as presenting information orally and visually can be used. Thereby cognitive overloading can be eliminated. Design tasks involve defining and establishing learning goals, developing effective learning strategies, selecting appropriate learning media, specifying desired learning outcomes, and creating assessments to evaluate the success of learning (Hutauruk et al., 2021).

3. **Develop:** In the develop stage of ADDIE model the learning topics that needs to be included, the LMS/ e learning mode that is used and other activities that needs to be added are considered (Hutauruk et al., 2021).Therefore, in the develop stage of a microlearning content creation it is necessary to cut out inessential information and present all essential information together in a well-structured manner so that split attention caused to the learners can be minimized.

4. **Implementation:** During the implementation stage the validity of the prepared instructional material needs to be checked so as to ensure it is suitable for use and it is also essential that learner participation is assured (Hutauruk et al., 2021).Considering the cognitive load managing strategies provided by (Clark, n.d.) while implementing the microlearning course there should be space provided to the learners for independent problem solving and independent learning as microlearning can foster self-directed learning of learners, real time feedback can also be ensured.

5. **Evaluation:** Evaluation stage includes a series of activities to assess if the learning design is implemented in an appropriate manner thereby helping to identify if any shortcomings exist in the developed design (Hutauruk et al., 2021). This stage includes various evaluation activities such as formative evaluation, summative evaluation, revision and reflection on the instructional material that is implemented (Hutauruk et al., 2021). Thereby it should be noted that evaluation of microlearning course designs include checking if the course design has helped in reducing the cognitive load. This can be attained by assessing cognitive load levels using different self-reported scales and also by monitoring task completion time (Ouwehand et al., 2021).

Table 2

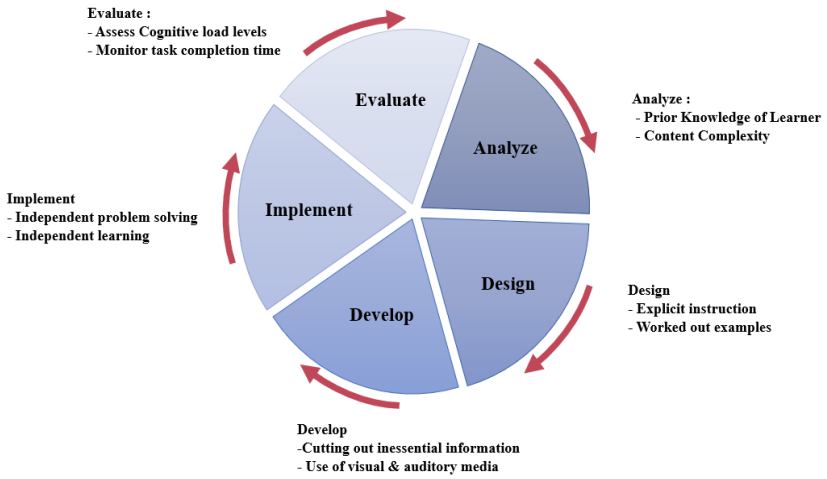
ADDIE Model stages with inherent and Cognitive Load theory-based strategies

ADDIE Model Stages	Inherent strategies	Cognitive load theory-based strategies
Analyze	Learner needs & Characteristics	Prior Knowledge and complexity of content
Design	Learning Objectives & Learning media	Explicit instruction & worked out examples
Develop	Learning activities & e-learning/LMS	Eliminate inessential information & use of dual modality
Implement	Deliver instruction & learner involvement	Independent learning & independent problem-solving opportunities
Evaluate	Formative & Summative evaluation	Assess Cognitive load levels & monitor task completion time

The 5 stages of ADDIE instructional design while designing a microlearning considering cognitive load theory is thus depicted in the figure 1.

Figure 1

Cognitive-Optimized Instruction: An ADDIE Model Aligned with Cognitive Load Theory



Conclusion

In the present study the role of microlearning in reducing cognitive load and thereby improving learning is discussed. This approach of using knowledge bites has been a

developing arena in instruction as it has several potential advantages including managing the load of learners. Thus, the article has tried to discuss an overview to understand this approach with its benefits and challenges. Also designing a microlearning learning design using ADDIE instructional design considering the cognitive load theory strategies discussed that can be used in tailoring future instruction are also discussed in the study. The ADDIE model developed with Cognitive load theory principles helps in reducing extraneous load and thereby optimizing intrinsic load thereby maximizing comprehension and retention of information. Additionally, this model is well-suited for e-learning environments, multimedia instruction, and blended learning contexts where cognitive load can easily increase due to varied content formats and delivery methods Thus, developing and implementing microlearning instruction tailoring to the principles of cognitive load theory is an emerging area in the field of instructional design. With practice and consistent development microlearning can play a significant role in developing future teaching-learning activities.

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Value Education in Contemporary India: Historical Foundations, Policy Perspectives and Pedagogical Practices

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Abstract

Value education has emerged as a critical concern in contemporary societies facing moral, ethical, and social crises. The erosion of fundamental values such as honesty, compassion, tolerance, and social responsibility has raised serious questions about education's purpose, which increasingly appears oriented toward material success rather than holistic human development (Mehta, 2021; Singh, 2023). This paper integrates historical perspectives from classical Indian and Western philosophical traditions, contemporary pedagogical practices, and India's National Education Policy 2020 to explore value education's conceptual meaning, classification systems, objectives, and pedagogical strategies. Critically examining the roles of teachers, families, and institutions, this study proposes a comprehensive framework for embedding value education within formal curricula while maintaining scientific rigor and policy relevance (Gupta, 2023; National Education Policy, 2020).

Keywords: Value education, moral education, character development, National Education Policy 2020, teacher role, pedagogical framework

Introduction

Education has historically been regarded as a powerful instrument for shaping intellectual capacity, moral character, social responsibility, and overall personality development. Traditional educational systems across civilizations emphasized holistic development integrating intellectual, moral, emotional, and spiritual dimensions. However, contemporary education systems have increasingly focused on examination performance, professional skills, and economic productivity, often neglecting ethical and humanistic development.

The present global society is experiencing a significant value crisis manifested through corruption, intolerance, violence, social fragmentation, and weakening civic responsibility. Ancient Indian educational traditions, particularly the Gurukul system, emphasized character formation, discipline, and moral consciousness as central

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objectives of education. Similarly, Western philosophers including Socrates, Plato, and Aristotle considered moral development as the core purpose of education.

In the Indian context, educational reforms have attempted to reintroduce value education as a core component of learning. The National Education Policy 2020 highlights the importance of developing ethical, compassionate, and responsible citizens while preparing learners for professional success.

Objectives of the Study

1. To examine the historical and philosophical foundations of value education in Indian and Western educational traditions.
2. To analyze the role of educational policies, particularly the National Education Policy 2020, in promoting value-based education in India.
3. To evaluate pedagogical strategies and institutional roles in the effective implementation of value education.

Methodology

The study adopts a qualitative and descriptive research design to examine various dimensions of value education. The research is primarily based on secondary data collected from academic books, peer-reviewed journal articles, government policy documents, and official educational reports. A conceptual and analytical framework is used to understand the evolution, significance, and application of value education across historical and philosophical traditions. The study also employs comparative analysis to examine similarities and differences between Indian and Western perspectives on value-based education. Additionally, policy analysis has been conducted to evaluate the scope and implementation strategies of the National Education Policy 2020 in integrating value education within formal educational systems.

Education in Historical Context

Education has traditionally been conceptualized as a powerful instrument for shaping intellectual capacities, moral character, social responsibility, and complete personality development (Singh, 2022; Behera, 2020; Lickona, 2009). However, in recent decades, education systems across the world have increasingly emphasized examination achievement and economic productivity, often at the cost of ethical and humanistic development (Singh, 2023; Mehta, 2021). This strategic reorientation has contributed to what many scholars describe as a pervasive value crisis manifested through widespread corruption, violence, intolerance, and erosion of empathy (Behera, 2020; Debbarma & Das, 2018).

In the Indian context, education historically represented a comprehensive instrument for integrated development encompassing bodily health, intellectual capacity, moral consciousness, and spiritual insight. Ancient Indian educational traditions, particularly the Gurukul system, emphasized character formation, self-discipline, respect for teachers, and cultivation of wisdom (pragya) and truth (satya) (Singh, 2022). This holistic vision recognized that educational success required development of intrinsic values—compassion, humility, truthfulness—alongside extrinsic behavioral standards (Joshi, 2002).

Similarly, Western philosophical traditions—from Socrates, Plato, and Aristotle—placed moral education explicitly at the center of pedagogy. Aristotle's concept of eudaimonia (human flourishing) emphasized that happiness derives from virtuous living developed through habituation and the harmonious integration of emotional and rational capacities (Aristotle, 1999). The fundamental assumption underlying both traditions was that authentic education produces morally conscious, socially responsible individuals capable of ethical judgment (Kohlberg, 1984).

The emergence of modernity fundamentally disrupted this consensus. The Enlightenment's emphasis on rationality and empiricism established a fact-value distinction that marginalized moral education within formal schooling systems (Singh, 2022; White, 2015). Secularization, declining religious authority, moral relativism, and positivism combined to displace character development from educational priorities (Singh, 2022; Giroux, 2003). The consequence has been a historically unprecedented departure from educational traditions: contemporary education systems increasingly produce technically competent but morally underdeveloped individuals (Behera, 2020; Singh, 2023; Lickona, 2004).

Concept and Meaning of Value Education

The term "value" has been subjected to varied interpretation across multiple disciplines including philosophy, sociology, psychology, and education (Mehta, 2021). Broadly conceptualized, values refer to principles, standards, or ideals that guide human behavior and judgment, influencing choices and actions, thereby shaping both individual personality development and collective social life (Behera, 2020; Singh, 2023; Joshi, 2002).

Kluckhohn's seminal formulation characterizes a value as "a conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the desirable, which influence the selection from available modes, means and ends of action" (Singh, 2023). This definition emphasizes values' dual manifestation: as individual psychological constructs and as socially sanctioned normative frameworks (Mehta, 2021).

Contemporary educational theorists increasingly emphasize that value education involves not merely cognitive understanding of abstract principles but affective internalization, behavioral manifestation, and consistent application across varied contexts (Lickona, 2009; Lovat & Clement, 2008; Berkowitz, 2011). Authentic value education produces individuals who both comprehend moral principles intellectually and demonstrate commitment to those principles through consistent ethical action (Kristjánsson, 2013).

Value education may be comprehensively defined as a planned, systematic, and deliberately structured educational process that aims at developing moral, ethical, social, spiritual, and civic values in learners (Mehta, 2021; Gupta, 2023; National Education Policy, 2020). This definition distinguishes value education from related concepts: moral education addresses moral principles and ethical reasoning; character education emphasizes virtuous dispositions; citizenship education focuses on democratic participation; ethical education addresses systematic analysis of moral principles (Althof & Berkowitz, 2006; Carr, 2009; Lickona, 2004, 2009).

Value education encompasses all these dimensions while maintaining a broader humanistic orientation encompassing emotional, spiritual, and existential development (Noddings, 1995). Critically, value education is concerned not merely with knowing what is right or wrong but with cultivating the disposition and capacity to act rightly—to make ethical choices and maintain moral commitment even when facing pressures to compromise (Lickona, 2004, 2009; Behera, 2020).

Contemporary Value Crisis and Its Manifestations

Contemporary societies exhibit extensive evidence of value degradation across institutional domains (Behera, 2020; Debbarma & Das, 2018; Gupta, 2023). The political sphere reveals widespread corruption, systemic dishonesty, manipulation of democratic processes, and exploitation of public resources for private enrichment. Commercial and economic domains demonstrate professional ethics degradation wherein professionals prioritize financial accumulation over service orientation and ethical responsibility (Behera, 2020; Singh, 2023).

Educational institutions reveal troubling erosion among educated classes, with systems producing technically competent individuals demonstrating minimal moral consciousness or social responsibility (Behera, 2020; Singh, 2023). This pattern—visible in corruption among educated professionals, exploitation by credentialed experts, and systematic dishonesty within educated classes—demonstrates compellingly that technical education without moral grounding generates dangerous combinations of competence and ethical confusion (Lickona, 2004; Behera, 2020).

According to Mehta (2021) and Gupta (2023), multiple interconnected factors have precipitated contemporary value crises: Materialistic cultural orientation wherein accumulation of physical possessions has become society's dominant objective (Mehta, 2021); Erosion of traditional role models wherein exemplars previously embodying valued qualities have been replaced with wealthy individuals (Singh, 2023); Insufficient moral leadership and inadequate teacher modeling (Behera, 2020; Singh, 2023); Technological acceleration amplifying competitive pressures and enabling unethical behaviors (Mehta, 2021); and Philosophical uncertainty regarding moral foundations (Singh, 2022; Gupta, 2023).

The Critical Role of Teachers, Families and Institutions

Research conclusively demonstrates that teachers exert disproportionate influence on students' value formation and moral development (Behera, 2020; Lickona, 2009; Kristjánsson, 2013). Teachers occupy positions of considerable authority in students' eyes, and students consistently demonstrate propensity to emulate teachers across multiple dimensions including values, behaviors, attitudes, and dispositions (Behera, 2020).

Psychological research confirms that individuals learn values primarily through observation and emulation of morally exemplary adults rather than through abstract moral instruction (Hoffman, 1982). Mirror neurons—neural structures enabling imitation and empathy—activate when individuals observe morally exemplary behavior, facilitating internalization of values through neural pathways distinct from those activated by verbal instruction (Narvaez, 2006). Teachers cannot authentically transmit values they themselves have not internalized or do not exemplify (Lickona, 2004, 2009; Kristjánsson, 2013).

Effective value education requires deliberate pedagogical strategies extending beyond traditional lecture-based instruction (Lickona, 2009; Lovat & Clement, 2008; Berkowitz, 2011): creating supportive classroom environments free from excessive competition; facilitating student expression and dialogue through open discussions; employing diverse pedagogical modalities including drama, literature, poetry, and narrative; utilizing case studies and moral dilemmas; community service and experiential learning; mentorship and role modeling; and reflective dialogue and philosophical inquiry.

While schools constitute important value education contexts, families remain primary sites of value formation and internalization (Behera, 2020; Hoffman, 1982; National Education Policy, 2020). Parental behavior, communication, emotional support, and moral modeling shape children's value commitments more fundamentally than schools alone can accomplish (Noddings, 1995). Schools and families must work collaboratively,

establishing consistency in value messaging and mutual support for each child's moral development (Behera, 2020).

Educational institutions can promote value education through structural and cultural changes (National Education Policy, 2020; Lickona, 2009): organizational culture transformation prioritizing character development; creation of democratic school governance structures enabling student participation; establishment of school-wide value commitments; integration of values across curricula and school practices; and community engagement establishing value education as community commitment.

Policy Framework: Value Education in National Education Policy 2020

The National Education Policy 2020 (NEP) represents a comprehensive policy commitment to reintegrating value education into the educational system at all levels. The policy explicitly recognizes that education must simultaneously develop technical competencies and cultivate moral character, rejecting the false dichotomy between professional preparation and character development. As the policy articulates, "Education must build character, enable learners to be ethical, rational, compassionate, and caring, while at the same time prepare them for gainful, fulfilling employment" (p. 4).

To achieve this, the framework mandates a curriculum revision aimed at integrating values across subject domains, noting that:

"The curriculum must include basic arts, crafts, humanities, games, sports and fitness, languages, literature, culture, and values, in addition to science and mathematics, to develop all aspects and capabilities of learners" (p. 11).

This curricular shift requires a pedagogical transformation toward more experiential, holistic, integrated, and inquiry-driven approaches. The policy specifies that "pedagogy must evolve to make education more experiential, holistic, integrated, inquiry-driven, discovery-oriented, learner-centred, discussion-based, flexible, and, of course, enjoyable" (p. 12).

Furthermore, the NEP 2020 emphasizes teacher development, recognizing that educators constitute the critical factor in value education success. It champions a holistic student development model encompassing physical, mental, emotional, and spiritual dimensions. By integrating arts, culture, and Indian knowledge systems, the framework enables culturally resonant value education, while its multidisciplinary approach allows students to recognize the relevance of values across diverse domains.

Finally, India's commitment to the United Nations' Sustainable Development Goals, particularly SDG 4 addressing "inclusive and equitable quality education and lifelong learning opportunities for all," necessitates these value-oriented education frameworks. The NEP 2020 explicitly aligns with this global imperative, recognizing that sustainable development requires individuals who are deeply committed to environmental stewardship, social justice, and collective welfare.

Implementation Framework and Systemic Challenges in Value Education

Effective value education implementation requires systemic changes spanning curriculum, pedagogy, assessment, teacher development, and institutional culture (Lickona, 2009; Gupta, 2023; National Education Policy, 2020).

Curricular integration involves embedding values throughout all subject domains; establishing cross-curricular value themes; integrating Indian philosophical and cultural traditions; incorporating contemporary global challenges; and connecting abstract values to concrete real-world applications (National Education Policy, 2020; Mehta, 2021).

Pedagogical strategies include moral case studies and ethical dilemma analysis; community service and experiential learning; mentorship and role modeling relationships; reflective dialogue and philosophical inquiry; creative expression through arts, literature, drama, music; and cooperative learning and collaborative moral reasoning (Lickona, 2009; Lovat & Clement, 2008).

Assessment frameworks should measure character development indicators moving beyond standardized testing; ethical reasoning development; behavioral consistency; portfolio-based evidence of moral development; and self-reflection and peer evaluation (Singh, 2023; Gupta, 2023).

Teacher development must include comprehensive preparation emphasizing moral development; continuing professional development in value education pedagogy; professional learning communities; mentorship structures connecting experienced value educators; and institutional support systems facilitating moral growth (Behera, 2020; Lickona, 2009).

Contemporary value education implementation faces substantial obstacles (Behera, 2020; Singh, 2023; Gupta, 2023): Curriculum overload leaving insufficient time for genuine moral development; Lack of instructional clarity regarding how to effectively teach values; Student resistance and cynicism particularly among adolescents; Evaluation and assessment difficulties arising from values' resistance to standardized measurement; Materialistic cultural dominance undermining value education's

effectiveness; Family value transmission degradation compounding educational institutions' challenges; Institutional contradictions wherein schools preach values while operating contradictingly; and Insufficient teacher preparation in value education.

Discussion and Recommendations

Comprehensive evidence establishes that value education is a fundamental educational function rather than an optional enhancement, rooted in historical traditions that universally view moral development as education's essential objective (Singh, 2022; Behera, 2020; National Education Policy, 2020).

Conversely, contemporary value crises directly correlate with the systemic neglect of ethics in modern schooling. Providing technical education without a solid moral grounding creates a dangerous combination of high competence and ethical confusion (Lickona, 2004; Behera, 2020).

To counter this, systemic alignment across institutional, familial, and community-wide boundaries is essential for success (Gupta, 2023; National Education Policy, 2020). Because teachers occupy an indispensable position as moral exemplars and value-transmitters, investing in their professional and moral growth represents the highest-priority intervention (Behera, 2020; Kristjánsson, 2013). Ultimately, effective value education must bridge the gap between individual aspiration and collective social transformation (Giroux, 2003; National Education Policy, 2020).

Recommendations for Educational Practice

- **Embody Leadership:** Teachers must actively recognize and embrace their roles as moral exemplars (Lickona, 2009).
- **Integrate Curricula:** Schools need to redesign curricula to weave ethical values across all academic disciplines.
- **Shift Pedagogy:** Classroom approaches must transition toward active dialogue and experiential learning (Behera, 2020).
- **Expand Assessment:** Evaluation frameworks must expand beyond academic testing to include character development indicators.
- **Build Partnerships:** Educational institutions must establish functional partnerships with families and local communities.

Recommendations for Educational Policy

- **National Prioritization:** Policymakers must prioritize value education within national curricula and frameworks (National Education Policy, 2020).

- **Teacher Preparation:** Professional development and initial teacher training must emphasize moral and ethical development pedagogy.
- **Accountability Reform:** National evaluation systems must innovate to measure character development and institutional culture (Gupta, 2023).
- **Resource Allocation:** Governments must allocate dedicated resources and funding to support long-term implementation and remove systemic barriers.

Conclusion

The evidence demonstrates that value education is not an optional add-on, but the core foundation of a complete education. When we teach technical skills without a moral framework, we create a dangerous gap between high competence and ethical confusion.

To bridge this gap and address our contemporary value crisis, we must view teachers as our most critical asset and highest-priority investment; they are the frontline moral exemplars for students. However, teachers cannot do this in isolation. Lasting success requires a complete systemic alignment—meaning schools, families, policymakers, and communities must work in harmony. Ultimately, value education must serve a dual purpose: guiding individual students to find their own moral footing, while simultaneously transforming society into a more ethical, collective whole.

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Artificial Intelligence and Academic Engagement among Secondary School Students in Kerala: A Theoretical Perspective

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Abstract

The increasing integration of Artificial Intelligence (AI) in educational contexts has significantly transformed traditional pedagogical approaches, offering innovative pathways to enhance student learning and engagement. Academic engagement, a multidimensional construct encompassing behavioral, emotional, and cognitive dimensions, remains a critical determinant of students' academic success, particularly at the secondary school level. This theoretical paper explores the relationship between AI and academic engagement among secondary school students in Kerala, India, by drawing upon key theoretical frameworks such as Self-Determination Theory, Constructivism, and the Technology Acceptance Model. The paper argues that AI-driven educational tools—through personalization, real-time feedback, and interactive learning environments—have the potential to foster deeper levels of engagement among students. At the same time, it critically examines the challenges associated with AI integration, including issues of over-dependence, ethical concerns, and digital inequality. By situating the discussion within the socio-educational context of Kerala, the paper proposes a conceptual model that links AI usage to academic engagement through psychological mediators such as motivation and perceived competence. The study contributes to the theoretical discourse on technology-enhanced learning and provides a foundation for future empirical research in the Indian educational landscape.

Keywords: Artificial Intelligence, Academic Engagement, Secondary School Students

Introduction

Education in the twenty-first century is undergoing a profound transformation, driven largely by advancements in digital technology and, more recently, Artificial Intelligence (AI) (Zawacki-Richter et al., 2019; Luckin et al., 2016).

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AI has emerged as a powerful tool capable of reshaping the ways in which knowledge is delivered, accessed, and constructed within educational settings (Luckin et al., 2016; Woolf, 2010). Unlike earlier technological interventions, AI offers adaptive, intelligent, and interactive systems that can simulate human-like cognitive processes, thereby enabling more personalized and efficient learning experiences (Woolf, 2010; Huang et al., 2019). In India, and particularly in Kerala, the integration of digital technologies into education has gained significant traction. Kerala's strong educational infrastructure, high literacy rates, and progressive policy initiatives have positioned it as a leader in adopting technology-enhanced learning. However, despite these advancements, a persistent challenge within secondary education is the issue of student engagement. Many students continue to experience disengagement due to rigid curricula, examination-oriented teaching, and limited opportunities for interactive learning. Academic engagement is widely recognized as a key predictor of educational success, influencing students' motivation, achievement, and long-term learning outcomes(Fredricks et al., 2004; Pintrich & De Groot, 1990)

Engaged students are more likely to participate actively in classroom activities, demonstrate sustained interest in learning, and employ higher-order cognitive strategies. In this context, AI presents a promising avenue for enhancing academic engagement by addressing some of the limitations inherent in traditional teaching methods.

Although a growing body of literature has shown the role of Artificial Intelligence (AI) in education, much of the existing research has primarily focused on higher education, technological innovations, or students academic performance. Comparatively fewer studies have examined how AI influences the construct of academic engagement, particularly among secondary school students. Furthermore, the Indian literature, especially within the context of Kerala, remains limited despite the state's progressive adoption of digital education initiatives and smart classroom practices. Existing studies often discuss AI from a technological perspective without integrating established educational theories to explain its influence on behavioural, emotional, and cognitive engagement. Moreover, factors such as teacher readiness, digital equity, language diversity, and ethical considerations have received relatively less theoretical attention. Addressing these gaps, the present paper provides a comprehensive theoretical framework that explains the relationship between Artificial Intelligence and academic engagement among secondary school students in Kerala by integrating relevant educational and psychological theories within the state's unique socio-educational context.

Artificial Intelligence in Education: Concept and Scope

Artificial Intelligence in education refers to the application of machine-based systems

that can perform tasks typically associated with human intelligence, such as learning, reasoning, problem-solving, and decision-making, in order to support and enhance educational processes (Luckin et al., 2016; Woolf, 2010). These systems are designed to analyze large amounts of data, identify patterns in student behavior, and provide personalized recommendations that facilitate learning.One of the defining features of AI in education is its ability to enable adaptive learning. Adaptive learning systems continuously monitor students' performance and adjust instructional content accordingly, ensuring that each learner receives instruction that is aligned with their individual needs and capabilities(Woolf, 2010). This is particularly important in diverse classroom settings, where students may vary widely in their prior knowledge, learning pace, and cognitive abilities.

In addition to adaptive learning, AI technologies include intelligent tutoring systems, automated assessment tools, and conversational agents such as chatbots. These tools provide students with immediate feedback, guidance, and support, thereby enhancing the overall learning experience. Students can access learning resources, practice exercises, and interactive simulations at any time, thereby fostering a more flexible and self-directed approach to learning. In the context of Kerala, where digital education initiatives have been actively promoted, AI has the potential to further strengthen the quality and accessibility of education.

Academic Engagement: Nature and Significance

Academic engagement is a multifaceted construct that reflects the degree to which students are actively involved in their learning process (Fredricks et al., 2004). It is generally conceptualized in terms of three interrelated dimensions: behavioral, emotional, and cognitive engagement. Behavioral engagement refers to students' observable participation in academic activities, such as attending classes, completing assignments, and contributing to discussions. Emotional engagement, on the other hand, encompasses students' affective responses to learning, including their interest, enjoyment, and sense of belonging within the educational environment. Cognitive engagement involves the extent to which students invest in understanding complex concepts, employing critical thinking, and regulating their own learning processes. It represents a deeper level of engagement that goes beyond surface-level participation and is essential for meaningful learning.

The importance of academic engagement lies in its strong association with positive educational outcomes. Research consistently demonstrates that students who are highly engaged are more likely to achieve better academic results, exhibit greater persistence, and develop lifelong learning skills. However, fostering such engagement remains a challenge in traditional educational settings, where teaching methods often fail to

accommodate individual differences and promote active learning.

Theoretical Foundations Linking AI and Academic Engagement

The relationship between Artificial Intelligence and academic engagement can be understood through several theoretical frameworks that explain how learning environments influence student behavior and motivation. Self-Determination Theory (SDT) provides a comprehensive framework for understanding how AI can enhance engagement by satisfying students' basic psychological needs. According to SDT, individuals are more likely to engage in activities when their needs for autonomy, competence, and relatedness are fulfilled (Deci & Ryan, 2000). AI-driven learning environments support autonomy by allowing students to learn at their own pace and make choices about their learning pathways. They enhance competence by providing immediate feedback and tailored instruction, enabling students to experience a sense of mastery. Furthermore, interactive AI systems can simulate social interaction, thereby fostering a sense of connection and relatedness.

Constructivist learning theory (Piaget, 1972; Vygotsky, 1978) offers another important perspective by emphasizing the active role of learners in constructing knowledge. According to this theory, learning is most effective when students are actively engaged in exploring concepts, asking questions, and reflecting on their experiences. AI tools facilitate this process by providing opportunities for inquiry-based learning, where students can interact with content, test hypotheses, and develop their own understanding. The Technology Acceptance Model (TAM) further explains how students' perceptions of AI influence their engagement. According to TAM, the adoption and effective use of technology depend on perceived usefulness and ease of use(Venkatesh & Davis, 2000). When students perceive AI tools as beneficial and user-friendly, they are more likely to engage with them, leading to enhanced learning outcomes.

The present paper adopts these theories as its primary theoretical foundations because each offers a distinct yet complementary perspective for understanding how Artificial Intelligence can enhance students' academic engagement. Self-Determination Theory explains how AI-supported learning environments can satisfy students' psychological needs for autonomy, competence, and relatedness, thereby fostering intrinsic motivation and sustained engagement (Deci & Ryan, 2000). Constructivist Learning Theory emphasizes that meaningful learning occurs when students actively construct knowledge through exploration, interaction, and reflection, processes that are effectively supported by AI-enabled adaptive and inquiry-based learning environments (Piaget, 1972;

Vygotsky, 1978). The Technology Acceptance Model explains students' willingness to adopt and use AI-based educational technologies by highlighting the importance of perceived usefulness and perceived ease of use, both of which influence learners' engagement with technology-enhanced instruction (Venkatesh & Davis, 2000). Together, these three theoretical perspectives provide a comprehensive framework for explaining not only how AI supports learning but also why it can promote behavioural, emotional, and cognitive engagement among secondary school students in the Kerala educational context.

Mechanisms of AI-Driven Academic Engagement

Artificial Intelligence enhances academic engagement through several mechanisms that transform the learning experience from passive reception to active participation. One of the most significant mechanisms is personalization. By tailoring instructional content to individual learners' needs, AI ensures that students are consistently challenged at an appropriate level. Another key mechanism is the provision of immediate feedback. AI systems provide real-time feedback, enabling students to identify errors, understand concepts, and make improvements instantly. This continuous feedback loop fosters a sense of competence and encourages sustained engagement.

Interactivity is another crucial aspect of AI-driven learning. Through conversational agents and intelligent tutoring systems, students can engage in dynamic interactions that simulate one-on-one instruction. These interactions promote active learning by encouraging students to ask questions, seek clarification, and explore ideas. AI also supports inquiry-based learning by providing access to a wide range of information and encouraging students to

investigate topics in depth. This approach aligns with higher levels of cognitive engagement, where students actively construct knowledge and develop critical thinking skills.

AI and Behavioural Engagement

Artificial intelligence has significant potential to enhance students' behavioural engagement in the learning process. AI-powered learning platforms can promote behavioural engagement by providing interactive learning environments that encourage students to actively participate in learning activities. For example, AI-based learning systems can provide quizzes, interactive simulations, and gamified learning activities that increase students' participation and time spent on learning tasks. When students receive immediate feedback from AI systems, they are more likely to stay engaged and continue working on tasks. In blended and online learning environments, AI can help maintain students' behavioural engagement by providing structured learning paths and interactive

content. AI-driven adaptive learning systems adjust the difficulty level of tasks according to students' performance, which prevents boredom and frustration and keeps students engaged in learning activities (Fredricks et al., 2004; Woolf, 2010).

AI and Emotional Engagement

Artificial intelligence also plays an important role in enhancing students' emotional engagement in the learning process. AI-based learning environments can make learning more interesting and enjoyable by providing interactive content such as videos, simulations, animations, and personalized learning materials. When learning becomes more interactive and personalized, students develop a positive attitude towards learning. AI systems can also provide personalized feedback and encouragement, which can increase students' motivation and confidence. Some AI systems are designed to recognize students' emotions through their responses and learning behaviour, and they can provide supportive feedback when students feel frustrated or discouraged. AI can also create a supportive and non-judgmental learning environment where students can learn at their own pace without fear of criticism. Therefore, artificial intelligence can enhance emotional engagement by making learning enjoyable, personalized, supportive, and motivating.

AI and Cognitive Engagement

Artificial intelligence can also significantly enhance students' cognitive engagement in the learning process. AI-powered adaptive learning systems can provide learning materials according to students' ability levels, which encourages deeper understanding rather than rote memorization. AI systems can present complex concepts through simulations, visualizations, and interactive models, which help students understand difficult topics more effectively. AI-based tutoring systems can ask questions, provide hints, and guide students through problem-solving processes, which promotes critical thinking and analytical skills. AI systems can also recommend additional learning resources based on students' performance, which encourages independent learning and exploration. Such learning environments encourage students to think critically and solve real-world problems. Therefore, artificial intelligence can enhance cognitive engagement by promoting critical thinking, problem-solving, deep learning, and independent learning.

AI and Academic Engagement in the Kerala Context

Kerala's educational landscape provides a unique and meaningful context for examining the role of artificial intelligence in enhancing academic engagement among students. The state has historically maintained a strong emphasis on education, literacy, and human development, which has resulted in high educational attainment and strong public investment in schooling. In recent years, Kerala has also made significant efforts to

integrate digital technology into classrooms through various ICT initiatives, smart classrooms, and digital learning platforms. In the Kerala context, AI-based learning platforms can support differentiated instruction by analysing students' learning pace, strengths, and difficulties and provide customized learning materials. Such personalized learning experiences can increase students' behavioural engagement by encouraging active participation, emotional engagement by making learning more interesting and relevant, and cognitive engagement by promoting deeper understanding and problem-solving.

However, the successful implementation of artificial intelligence in Kerala's education system depends on several important factors. One of the most significant factors is teacher readiness and technological competence. Teachers must be trained not only in the technical use of AI tools but also in pedagogical strategies that integrate AI into teaching in a way that promotes critical thinking, creativity, and collaborative learning. Another important factor is infrastructural support. Although Kerala has made progress in digital education, disparities still exist in terms of internet connectivity, device availability, and technological infrastructure across rural and urban schools. For AI-based education to be effective, schools must have reliable internet access, digital devices, and technical support systems.

Furthermore, the linguistic and cultural diversity of Kerala necessitates the development of AI systems that are inclusive and contextually relevant. Kerala has a multilingual environment where Malayalam is the primary medium of communication and instruction in many schools. Therefore, AI educational tools must support regional languages, especially Malayalam, to ensure accessibility and inclusivity. AI systems that incorporate local culture, examples, and context-based learning content can enhance students' emotional engagement, cultural identity, and sense of belonging in the learning process.

Thus, the integration of artificial intelligence in Kerala's educational context has significant potential to enhance academic engagement, but its success depends on teacher readiness, infrastructure, policy support, and culturally responsive technological design. When implemented thoughtfully and ethically, artificial intelligence can become a powerful tool to enhance students' behavioural, emotional, and cognitive engagement in the learning process.

Challenges and Critical Considerations

Despite its potential benefits, the integration of AI in education is not without challenges. The over dependence of AI in post Covid period has resulted a drastic increase in mobile phone and online game addictions, eventually drifting from the actual purpose of online education (Zawacki-Richter et al., 2019). One of the primary concerns is the risk of over-

reliance on AI, which may lead to a decline in critical thinking and independent learning. When students depend excessively on AI-generated responses, they may engage less deeply with the learning material. Ethical concerns also arise in relation to academic integrity, as AI tools can be misused to complete assignments without genuine effort. This raises important questions about assessment practices and the need for guidelines to ensure responsible use of technology. Another significant challenge is the digital divide, which affects access to AI technologies. Although Kerala has made considerable progress in digital education, disparities in access to devices, internet connectivity, and digital literacy persist, particularly among students from disadvantaged backgrounds. These challenges highlight the importance of adopting a balanced approach to AI integration, where technology is used to complement rather than replace traditional teaching methods.

Conclusion

Artificial Intelligence has the potential to significantly enhance academic engagement among secondary school students by creating personalized, interactive, and student-centered learning environments (Luckin et al., 2016; Fredricks et al., 2004). Through mechanisms such as adaptive learning, immediate feedback, and inquiry-based exploration, AI can foster deeper levels of engagement that are essential for meaningful learning. However, the

successful integration of AI in education requires careful consideration of ethical, pedagogical, and contextual factors. In the context of Kerala, leveraging the potential of AI while addressing challenges such as the digital divide and teacher preparedness is crucial for achieving equitable and sustainable educational outcomes.Ultimately, AI should be viewed as a complementary tool that enhances the role of teachers and empowers students to become active, engaged, and self-directed learners.

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Challenges Faced by Prospective Teachers in Developing Mathematical Competencies among Secondary School Students during Internship

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Abstract

Mathematics is not just a subject but a way of thinking. Competency-based learning ensures that students solve problems and understand, apply, and analyse concepts and skills needed far beyond the classroom. The competencies, namely conceptual understanding, problem-solving, computational thinking, and logical reasoning, help students apply mathematics in real-life situations. These competencies foster higher-order thinking, support lifelong learning, and have cross-disciplinary value. Developing mathematical competencies is crucial not only for academic achievement but also for nurturing globally competent, analytic, and reflective citizens in the 21st century. This study investigates the challenges faced by Prospective teachers during internships while developing mathematical competencies in secondary school students. Developing mathematical competencies among secondary school students is a crucial aspect of teaching. Prospective teachers during their internship often face multiple challenges while trying to enhance students' conceptual understanding, problem-solving skills, and computational abilities. The present study aims to analyse the challenges faced by prospective teachers in developing mathematical competencies among secondary school students. A descriptive survey method was employed using a questionnaire consisting of 19 items divided into five dimensions: student-related challenges, teacher-related challenges, curriculum and textbook challenges, school environment and resource challenges, and Classroom management and time constraints. Data were collected from 30 prospective teachers from four colleges in the Wayanad district, Kerala, and analysed using simple percentage analysis.

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Keywords: Prospective teachers, mathematical competencies, internship challenges, secondary school students.

Introduction

Mathematics plays a vital role in shaping students' reasoning, analytical, and problemsolving skills. Developing mathematical competencies equips learners to apply their knowledge effectively in daily life and future studies. According to Niss (2003), mathematical competence refers to an individual's ability to understand, apply, and communicate mathematics in diverse contexts. These competencies include conceptual and procedural understanding, problem-solving, reasoning, and a positive attitude toward the subject (Kilpatrick, Swafford, & Findell, 2001). Therefore, fostering mathematical competence among secondary school learners remains a key objective of modern education.

In teacher education programs, prospective teachers occupy a central position in promoting these competencies. The internship component provides them with opportunities to connect theory with practice and to experience authentic classroom teaching under supervision. Zeichner (2010) describes field experiences as the bridge that connects educational theory with classroom realities. Yet, despite its significance, this phase often exposes various challenges that can hinder the intern's ability to support students' mathematical growth effectively. These challenges can be grouped into five main dimensions (Ambusaidi & Al-Musawi, 2020; Karp, 2019): Student-related challenges, Teacher-related challenges, Curriculum and textbookrelated challenges, School environment challenges, Classroom management and time constraints.

Student-related challenges include weak basic concepts, difficulty in basic operations, interest in mathematics, students relying on memorization, and difficulty in problem-solving. Many secondary school students struggle with weak foundational skills, misconceptions, and math anxiety, which hinder their ability to understand new concepts. Mutodi and Ngirande (2014) reported that negative attitudes toward mathematics and low confidence levels significantly affect students' achievement. Adegoke (2013) found that fear of failure and lack of study habits reduce engagement in mathematics classes. During an internship, prospective teachers face the challenge of addressing these issues within limited classroom time while maintaining student interest. Encouraging conceptual understanding and problem-solving in such contexts becomes demanding for inexperienced teachers.

Teacher-related challenges refer to the personal and professional difficulties that interns face while teaching mathematics. Effective mathematics teaching requires a combination

of subject expertise and pedagogical content knowledge (Shulman, 1986). It includes difficulty in connecting with real-life examples, difficulty in checking students' conceptual understanding, time constraints in activities, and a lack of confidence in technology integration. Ball, Thames, and Phelps (2008) emphasized that specialized content knowledge for teaching mathematics is distinct from general subject knowledge and requires deliberate development.

The curriculum and textbook serve as primary tools that guide mathematics instruction. The Kerala School Curriculum (SCERT, 2019**)** promotes competency-based learning and encourages active, learner-centered strategies. However, many prospective teachers find the curriculum extensive and time-consuming. Karp (2019) pointed out that overloaded syllabi and exam-oriented systems often limit teachers' ability to emphasize conceptual learning. Difficulty in textbook activities, procedural focusing, emphasis on creative problem solving, importance of textbooks in competency-based teaching were analysed. Textbooks may also emphasize procedural drills instead of exploration and problem-solving. For interns, completing lessons within the time schedule while ensuring understanding is difficult. The pressure to finish the syllabus frequently leads to reliance on lecture methods rather than competency-focused activities.

The school environment plays a vital role in shaping internship experiences. Supportive schools can enhance an intern's motivation and professional identity, whereas restrictive environments can cause stress and limit innovation. Large class sizes, limited digital facilities, lack of teaching aids, and classroom environment are also barriers to prospective teachers. Zeichner (2010) noted that the nature of school culture and the quality of mentoring significantly influence teacher learning. Resources are crucial for engaging and meaningful mathematics instruction. Visual aids, manipulatives, and digital technologies help learners connect abstract mathematical ideas to concrete experiences. However, many schools, especially in rural areas, face shortages of teaching aids, ICT facilities, and updated infrastructure. Ponte, Quaresma, and Mata-Pereira (2019) found that prospective teachers often feel uncertain about using technology effectively in mathematics classrooms. Insufficient access to projectors, mathematical kits, or interactive learning tools restricts the use of modern pedagogies. These limitations make it difficult for interns to design creative, activity-based lessons that foster mathematical competencies. Completing lessons within the schedule while ensuring understanding is difficult. The pressure to finish the syllabus frequently leads to reliance on lecture methods rather than competency-focused activities.

Need and Significance of the Study

Mathematics education at the secondary school level has a significant role in developing learners' intellectual abilities and preparing them to deal with mathematical situations in

academic, personal, and real-life contexts. Mathematics learning is no longer viewed only as the acquisition of formulas, rules, and computational procedures. The contemporary emphasis is on developing mathematical competencies that enable learners to understand concepts, reason logically, solve problems, communicate mathematical ideas, make connections among different mathematical concepts, and apply mathematical knowledge in unfamiliar situations. The effective development of such competencies largely depends on the quality of classroom instruction and the ability of teachers to create meaningful learning experiences. Prospective teachers, as future professionals in the field of education, require adequate subject knowledge, pedagogical understanding, and practical skills to facilitate competency-oriented mathematics learning. The internship component of teacher education provides an important opportunity for prospective teachers to translate theoretical knowledge and pedagogical principles into actual classroom practice. However, the practical implementation of these principles may not always be easy. While teaching secondary school students during internship, prospective teachers may encounter several challenges related to their content knowledge, pedagogical skills, lesson planning, selection of suitable teaching strategies, classroom management, assessment practices, time constraints, availability of teaching-learning resources, and differences in students' learning abilities and interests. They may also experience difficulties in adapting competency-based and learner-centred approaches to the actual classroom context, particularly where traditional, examination-oriented teaching practices are more common. The complexity of these challenges highlights the need to systematically examine the experiences of prospective teachers during internship and to understand the factors that influence their efforts to develop mathematical competencies among secondary school students.

The significance of the present study lies in its potential to provide a deeper understanding of the practical challenges encountered by prospective teachers in developing mathematical competencies during their internship. The findings may help teacher educators identify the specific areas in which prospective teachers require additional academic preparation, pedagogical training, mentoring, and classroom support. Such information can contribute to strengthening teacher education programmes by establishing a closer connection between theoretical preparation and the practical demands of classroom teaching. The findings may also be useful in designing internship programmes that provide prospective teachers with adequate opportunities to practise competency-oriented mathematics teaching, receive constructive feedback, reflect on their classroom experiences, and improve their teaching practices. Cooperating teachers and schools may benefit from the study by gaining a better understanding of the difficulties faced by prospective teachers and by providing appropriate guidance and support during the internship period. The study may also be useful to curriculum

planners, teacher educators, educational administrators, and researchers in developing appropriate strategies for improving mathematics teacher preparation. By addressing the challenges identified through the study, prospective teachers may become better equipped to design meaningful learning experiences, respond to learner diversity, use appropriate pedagogical approaches, and assess students' mathematical learning more effectively. In the broader context, strengthening the preparation and internship experiences of prospective mathematics teachers can contribute to improving the quality of mathematics instruction at the secondary school level. It may ultimately support the development of students' conceptual understanding, problem-solving ability, logical reasoning, mathematical thinking, and ability to apply mathematics in varied contexts. Therefore, the present study is significant not only for understanding the challenges of prospective teachers but also for informing improvements in teacher education and contributing to the effective development of mathematical competencies among secondary school learners.

Objectives of the Study

1. To examine the challenges encountered by prospective teachers in developing mathematical competencies among secondary school students during internship.
2. To find the level of challenges faced by the prospective teachers in developing mathematical competencies among secondary school students during internship.

Methodology

The study followed a descriptive survey design using a quantitative approach.

Population and sample

The population comprised of all B.Ed. Mathematics prospective teachers in Kerala. A purposive sample of 30 B.Ed. Students undergoing internships in various secondary schools of the Wayanad district were selected.

Tool

A questionnaire with Yes/No questions was prepared to collect data regarding challenges faced by prospective teachers. The tool contained 19 items categorised under five dimensions: student-related challenges, teacher-related challenges, curriculum and textbook challenges, school environment and resource challenges, and classroom management and time constraints.

Data collection

The questionnaire was distributed to participants during their internship period.

Statistical analysis

Data were analysed using percentage analysis to determine the percentage of trainees facing specific challenges and to identify the level of the challenges faced.

Analysis and Findings

Table 1

Percentage of the components of student-related challenges

Statement	Yes (%)	No (%)
Students have weak basic concepts	73.3	26.7
Students find basic operations difficult	66.7	33.3
Students show low interest in mathematics	63.3	36.7
Students rely on memorisation	63.3	36.7
Students find problem-solving difficult	80	20

Table 1 shows that most prospective teachers reported that students struggle with basic concepts, operations, problem-solving, and have low interest in mathematics, affecting competency development.

Table 2

Percentage of components of the teacher-related challenges

Statement	Yes (%)	No (%)
Hard to explain with real-life examples	30	70
Hard to check understanding	46.7	53.3
Time management issues during activities	80	20
Lack confidence in using technology	33.3	66.7

Table 2 shows that Trainees face challenges in managing time effectively during activities.

Table 3

Percentage of the components of the curriculum and textbook-related challenges

Statement	Yes (%)	No (%)
Textbook activities are difficult	66.7	33.3
Textbooks focus more on procedures	53.3	46.7
Syllabus limits creative problem-solving	43.3	56.7
Textbooks lack guidance for competency-based teaching	76.7	23.3

Table 3 shows that Curriculum and textbook constraints hinder effective competency development, with an overemphasis on procedures and difficulty in activities.

Table 4

Percentage of the components of the school environment and resource-related challenges

Statement	Yes (%)	No (%)
Lack of teaching aids	60	40
The classroom is not suitable for discussion	43.3	56.7
Limited digital tools	36.7	63.3
Large class size	83.3	16.7

Table 4 shows that inadequate resources, large classes, and non-conducive environments significantly affect teaching effectiveness.

Table 5

Percentage of the components of classroom management and time constraints related challenges

Statement	Yes (%)	No (%)
Difficulty maintaining discipline	63.3	36.7
Less time to complete lessons effectively	83.3	16.7

Table 5 shows that classroom management and time constraints are more important **challenges** for prospective teachers during internships.

Figure 1

Percentage of major challenges faced by the prospective teachers

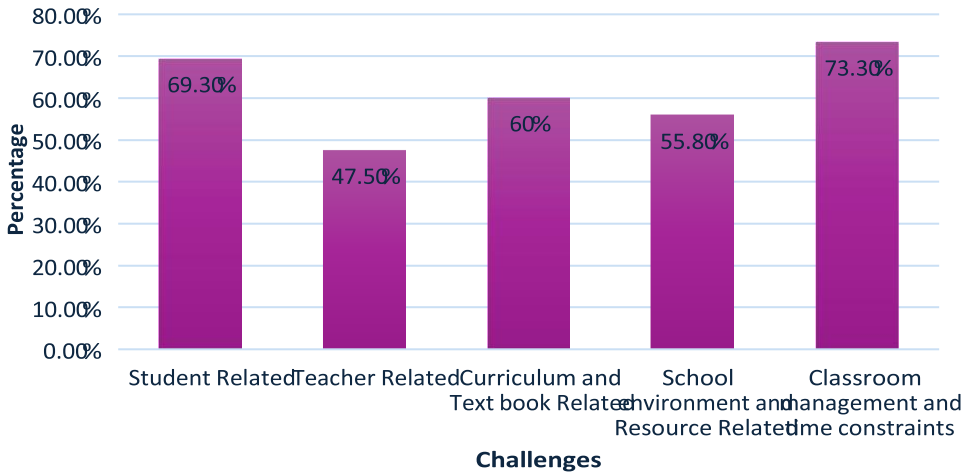


Figure 1 illustrates that student-related issues, classroom management, and time constraints are the primary challenges faced by prospective teachers in developing mathematics competencies among secondary school students.

Computation of the level of challenges faced by the prospective teachers for developing mathematics competencies among secondary school students

The investigator classified the total sample into 3 groups as

High challenges faced group : those having scores at or above M + σ
Low challenges faced group : those having scores at or below M - σ
Average challenges faced group : those having scores between M + σ and M -σ

To identify the level of the challenges faced by the prospective teachers, a percentage analysis was done by taking the mean and Standard deviation as the determinants

Table 6

Distribution of scores of the challenges faced by the prospective teachers

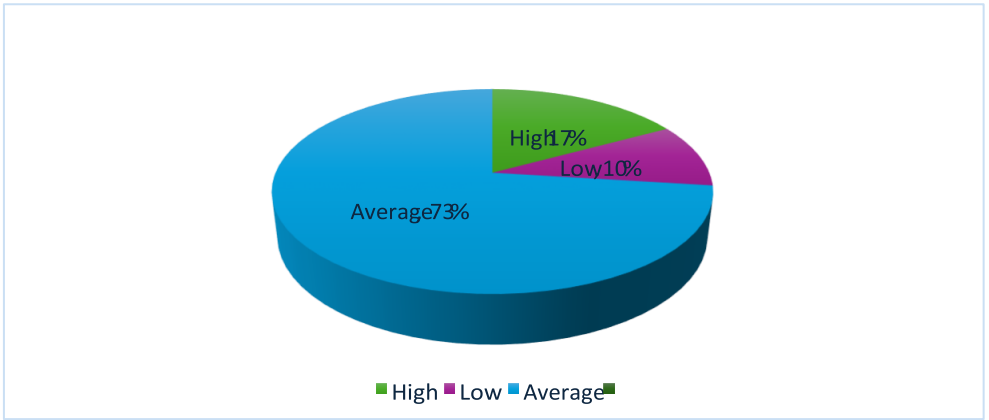
Challenges	No. of responses	Percentage
High (At or Above M+ **σ)**	5	17
Average (Between M+**σ** and **M-σ)**	22	73
Low (At or below M – **σ)**	3	10

Table 6 shows that 17% of prospective teachers face high challenges, 73% have average challenges, and 10% have low challenges for developing mathematics competencies among secondary school students.

The distribution of the scores of the challenges faced by the prospective teachers for developing mathematical competencies among the secondary school students is presented in Figure 2.

Figure 2

Level of the challenges faced by prospective teachers for developing mathematical competencies.



Findings

The study reveals that prospective teachers face multiple interrelated challenges:

- Students' weak foundations in mathematics and low interest hinder learning.
- Teachers struggle with innovative methods, real-life applications, and assessment of understanding.
- Curriculum and textbooks emphasise procedures, limiting conceptual learning and creative problem solving.
- Lack of resources, large class sizes, and limited digital tools create environmental constraints.
- Classroom management and time limitations further affect teaching quality.

Recommendations

1. Conduct bridge courses to strengthen students' basic mathematical operations before teaching higher concepts.
2. Provide training workshops for prospective teachers on innovative teaching strategies and technology integration.
3. Include conceptual, activity-based, and competency-focused tasks in the textbooks.
4. Improve school resources such as teaching aids and digital tools.
5. Reduce class sizes where possible and provide mentor support for classroom management.
6. Allocate adequate lesson time for activities and problem-solving sessions.

Scope and Limitations of the study

The study focuses on the challenges faced by prospective teachers during their internship in developing mathematical competencies among secondary school students. The study looks at challenges related to students, teachers, curriculum and textbooks, school environment and resources, and classroom management and time. The study is conducted among 30 prospective teachers from four teacher education colleges in Wayanad district, Kerala. The findings may help teacher educators and prospective teachers understand these challenges and find ways to improve the teaching and learning of mathematics.

The study has the following limitations:

1. The study is restricted to secondary school students.
2. The sample has been selected only from Wayanad district.
3. A limited number of samples were selected.
4. The analysis was focused on a few challenges faced by the prospective teachers.
5. The tool was not standardised.
6. The findings of the study were based on the information supplied by the respondents; it might have its own limitations.

Conclusion

The study highlights the significant challenges faced by prospective teachers in developing mathematical competencies among secondary school students. Addressing these challenges requires collaborative efforts from teacher training institutions, curriculum developers, and schools to ensure effective teaching and holistic learning. By implementing the suggested strategies, the internship experience can be enhanced, thereby improving students' mathematical competency outcomes.

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Teacher Strategies for Reducing Academic Procrastination in AI-Integrated Higher Education

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Abstract

Modern technology is a major factor that contribute to academic procrastination. While sophisticated technologies have a substantial impact on learning by simplifying numerous tasks, they can also lead to an increase in student procrastination. As a result, in the contemporary era, instructors must grasp how to successfully confront such procrastination. This conceptual review synthesizes findings from recent empirical and theoretical studies to propose a comprehensive framework for reducing procrastination in AI-integrated learning environments in higher education. The paper adopts a conceptual review approach by systematically analysing peer-reviewed articles, theoretical models, and recent empirical studies on academic procrastination, AI-supported learning, and interventions to overcome procrastination. The sources were identified through database searches (Google Scholar, Eric , Research gate), screened conceptually for relevance, and thematically synthesized to generate an integrative model. This paper found that academic procrastination is caused by a complex interplay of cognitive, emotional, behavioural, and technical elements, including cognitive overload, emotional avoidance, poor self-regulation, digital distraction, and overreliance on artificial intelligence. The integrated intervention model, which combines academic, technological, and therapeutic strategies, shows that structured task design, AI-supported self-monitoring, and teacher-led coaching can effectively reduce procrastination while increasing students' motivation, self-efficacy, and timely task engagement.

Keywords *: Academic procrastination, AI integrated learning, academic interventions, technological interventions, therapeutic interventions.*

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Introduction

In this era of advancing AI in education utilizing the potential of AI in the right way helps students to reduce the burden of learning and minimizes the workload of teachers. AI provides innovative tools for educational instruction for teachers that is crucial in transacting curriculum in an effective and need-based manner. AI contextualization allows learning materials to be tailored to the needs of all learners according to the diversity of the classroom. Improper use of technology can lead to negative consequences for students' learning such as language difficulties, internet addiction, and psychological issues. Therefore Teachers need to follow innovative strategies to address academic procrastination among students.

Procrastination, the habitual delay of academic tasks despite knowing the negative consequences, is a common challenge among university students (Jebasingh et al. 2015). Academic procrastination occurs when students delay their academic tasks for a variety of reasons such as AI dependence, stress, poor time management and fear of failure. Numerous studies have demonstrated the strong correlation and mutual influence between academic procrastination and academic achievement. Students' procrastination behaviour may therefore be harmful to their education.

Academic procrastination must be addressed via an integrated lens that considers cognitive, emotional, behavioural, social, and technological factors. The current conceptual article combines empirical results from recent literature to create a comprehensive model that depicts the reasons of academic procrastination as well as the academic, technological, and therapeutic approaches that can effectively reduce it. This paper intends to provide a holistic framework for future research, policy formation, and evidence-based instructional practices aimed at reducing student procrastination by combining insights from behavioural psychology, educational technology, and pedagogical practice.

Causes of Academic Procrastination

Academic and Cognitive Overload

Heavy academic pressure has been demonstrated to increase reliance on AI tools like ChatGPT, which reinforces delay habits (Jebasingh et al., 2025; Sundararasan, 2025). Academic load has an impact on learners' motivation, interest, and self-regulation, making them less engaged in academic activities and delaying academic assignments (Zacks & Hen, 2018). Boredom, disinterest in duties, and a lack of genuine interaction contribute to avoidance. Studies reveal that when students' involvement is poor, they resort to avoidance methods such as procrastination (Zacks & Hen, 2018). Time strain and poor time management have also been connected to academic load (Zacks & Hen,

2018). Tight deadlines, limited preparation time, and weak planning abilities cause students to delay academic assignments and impair self-regulation in their own learning (Perrin et al., 2011). Students who lack metacognitive techniques, such as academic planning and reflective learning, fail to begin and maintain task engagement (Zacks & Hen, 2018). Cognitive overload and mental tiredness can both contribute to students' academic procrastination favourably (Sundararasan, 2025).

Psychological Causes

Students' incapacity to engage with academic assignments on a consistent basis is influenced by emotional avoidance, a lack of support, and persistent concentration issues (Zacks & Hen, 2018). Emotional avoidance is crucial because students commonly postpone work to escape stress, fear of failure, negative evaluations, or performance-related anxiety, which provides momentary relief but eventually leads to regular procrastination (Perrin et al., 2011; Zacks & Hen, 2018). This tendency is worsened when students do not receive proper academic and psychological support; poor guidance, restricted feedback, and insufficient institutional scaffolding raise stress, reduce clarity, and push students to avoidance behaviours (Zacks & Hen, 2018). Furthermore, digital distraction and attention issues contribute significantly to psychological stress since frequent interruptions, multitasking, and difficulties maintaining focus impede learning routines and increase delay behaviours.

Overdependence on AI Tools.

Excessive dependence on AI for task completion decreases effort, undermines intrinsic desire, and can lead to a false sense of efficiency (Jebasingh et al., 2025; Sundararasan, 2025). Dependence on ChatGPT has been linked to impaired memory, poor academic performance, and increased procrastination (Jebasingh et al., 2025). Using ChatGPT may make pupils lethargic. As a result, research reveal that ChatGPT is positively associated with procrastination (Jebasingh et al., 2025; Sundararasan, 2025).

Academic procrastination can be caused by a number of circumstances, including excessive workload, time limits, poor self-control, low engagement, emotional avoidance, cognitive overload, excessive dependence on AI, unstructured activities, a lack of academic support, and digital distractions. Together, these factors result in avoidance behaviours that delay completing schoolwork.

Interventions Aimed at Reducing Academic Procrastination

Academic procrastination can be reduced through various teacher strategies in the classroom. The interventions fall broadly into three categories: academic interventions, Technological interventions and therapeutic interventions.

Academic Interventions

Studies shows that several academic approaches might lessen students' procrastinating tendencies. Restructuring academic assignments into smaller, more manageable chunks is necessary to prevent academic procrastination (Zacks & Hen, 2018). Students are more capable of starting work and maintaining effort when assignments are properly chunked and sequenced (Perrin et al., 2011). This process is further strengthened by the development of self-regulation and metacognitive skills, as goal-setting, academic planning, and reflective learning enable students to track their progress, assess their methods, and make well-informed modifications to their learning strategies (Zacks & Hen, 2018).

Students' procrastination is largely reduced by classroom-based treatments that promote self-regulated learning (Zacks & Hen, 2018). Procrastination can be effectively managed with strategies including goal-setting (SMART goals), calendar integration, reminders, self-monitoring, and task motivation (Bhattacharjee et al., 2024; Zacks & Hen, 2018). These techniques support students' task organization, motivation, and timely completion of assignments. Peer accountability techniques, like group-based deadlines, peer-reporting systems, and cooperative assignments, offer social reinforcement that promotes timely job completion (Duan et al., 2024). By fostering an inspiring and encouraging learning atmosphere, more social support has been demonstrated to improve students' goal-setting behaviour, decrease procrastination linked to writing, and reduce distractions, teacher intervention methods found in the literature are usually effective and simple to implement (Zacks & Hen, 2018).

Technological Interventions

Artificial intelligence (AI) can help students in higher education to effectively reduce academic procrastination by promoting self-regulation, raising awareness, and improving work management (Bhattacharjee et al., 2024; Sundararasan, 2025). Teachers can promote the educational use of generative AI such as AI-mediated reminders, reflective nudges, chatbots, and self-reflection tools improve self-monitoring, reduce distractions, and help students resume academic tasks, thereby reducing procrastination (Bhattacharjee et al., 2024).

According to (Lee et al., 2025), the CBT-based chatbot intervention combined with a time management to-do list software was more effective in changing user behavior and offering psychological support. While calendar and time-blocking chatbots facilitate planning, mood tracking, and concentrated task engagement, tools like the GanttBott Telegram chatbot give alerts, reschedule jobs automatically, and provide encouraging messages that reduce overdue tasks (Duan et al., 2024). AI-powered feedback systems

promote self-monitoring through analytics, enhance intrinsic motivation through interactive learning, and scaffold weekly or smaller assignments (Bhattacharjee et al., 2024). Technological interventions greatly improve students' self-efficacy, motivation, discipline, and general capacity to control procrastination by promoting teacher-student contact, supporting unique learning styles, and establishing an organized but stress-free study environment.

Therapeutic Interventions

By using organized training programs, coaching-based support, and individualized behavioural counselling in the classroom, teachers can play a critical therapeutic role in lowering academic procrastination (Lee et al., 2025; Zacks & Hen, 2018). Short seminars, reflective coaching sessions, and CBT-informed techniques help students reorganize harmful thoughts, develop emotional regulation abilities, and implement efficient time management techniques. Recent strategies also emphasize digital tools, including time-management software and CBT-based chatbots, which supplement instructor direction by providing consistent feedback, methodical reorganization of academic assignments, and motivational cues (Lee et al., 2025). When combined, these therapy resources seek to improve students' self-efficacy, motivation, self-discipline, and goal-directed behaviour, which will ultimately promote regular study habits and lessen procrastinating tendencies.

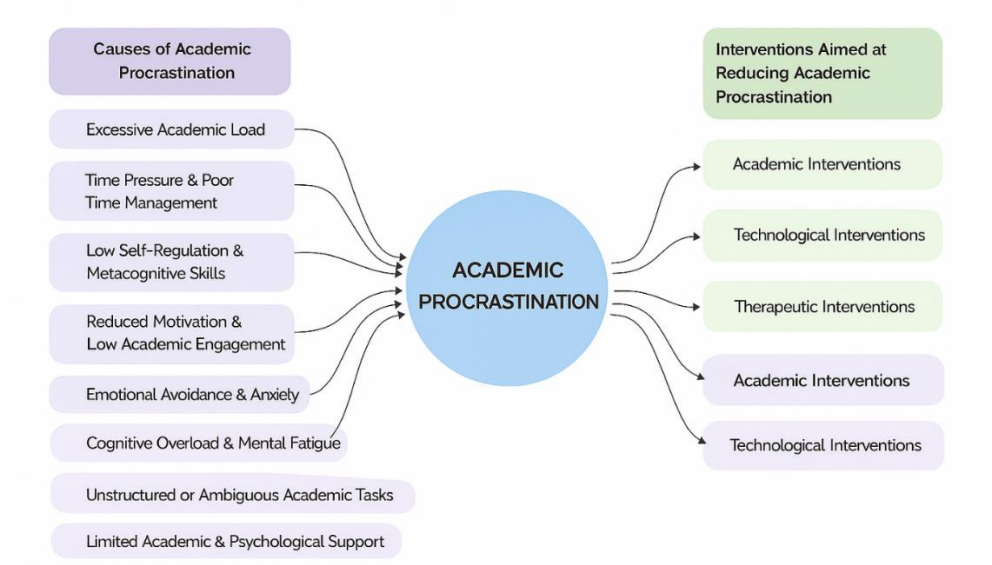
Conceptual model

The conceptual model presented in this work integrates the multifaceted causes of academic procrastination with the three primary intervention types academic, technical, and therapeutic highlighted in recent studies. The model states that academic procrastination is caused by a number of factors, including cognitive overload, emotional avoidance, unstructured activities, inadequate self-regulation, digital distraction, and an over-reliance on artificial intelligence. When combined, these factors affect students' behavioural and motivational responses, reducing task initiation and sustaining delay patterns. The model also demonstrates how targeted interventions can improve children's emotional, behavioural, and cognitive skills in order to break these avoidance loops. Task restructuring, distributed learning activities, and self-regulation training are academic therapies that directly reduce cognitive load while enhancing clarity, task engagement, and autonomous learning. Technological interventions help students maintain continuity, manage distractions, and maintain focused study habits by scaffolding their monitoring processes. These interventions include time-management software, reflective nudges, generative AI support systems, and interruption management tools. Therapeutic therapies, such as teacher-led coaching, CBT-informed

approaches, and emotional regulation training, target the underlying affective causes of procrastination by reducing anxiety, altering maladaptive thought patterns, and increasing confidence and self-efficacy. Together, these components form an integrated framework that illustrates the ways in which cognitive, emotional, behavioural, and technical mechanisms impact procrastination. Additionally, it demonstrates how coordinated intervention techniques can enhance academic achievement, reduce avoidance, and boost self-regulation.

Figure 1

Diagrammatic Representation causes and Interventions of academic procrastination



Conclusion

This conceptual paper describes academic procrastination as an evolving issue caused by the combination of cognitive overload, emotional avoidance, poor self-regulation, digital distractions, and excessive reliance on AI tools. By combining information from academic, technical, and therapeutic areas, the research demonstrates that reducing procrastination necessitates an integrated, multi-layered strategy rather than individual solutions. Academic interventions such as task restructuring, goal-setting, and active learning improve clarity, engagement, and autonomous study habits, however technological tools such as generative AI, reflective nudges, and distraction-management systems improve monitoring and learning continuity. Teacher-led therapeutic assistance targets the emotional and psychological hurdles that contribute to delay behaviours, boosting students' confidence, emotional regulation, and motivation. These

interconnected mechanisms form a comprehensive framework that explains why procrastination persists as well as how coordinated interventions can effectively disrupt avoidance cycles, promoting students' sustained self-regulation, improved academic performance, and healthier learning behaviours.

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Social Commitment in Teacher Education: Concepts, Dimensions and Contemporary Challenges

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Abstract

Social commitment is a vital attribute that prospective teachers must develop to effectively respond to the demands of modern education. This article explores the concept of social commitment among prospective teachers in the context of contemporary educational changes influenced by technology, globalization, and inclusiveness. It highlights the evolving role of teachers as facilitators, mentors, and agents of social change, emphasizing their responsibility not only towards students but also towards society at large. The article discusses key dimensions of social commitment, including commitment to students, society, the teaching profession, and environmental and cultural sustainability. The article also discusses how contemporary educational trends, such as digital learning and multicultural classrooms, influence the development of social commitment among prospective teachers. Furthermore, the article identifies various factors influencing social commitment, including teacher education programmes, family background, institutional environment, community exposure, and personal values. Challenges faced by prospective teachers, such as lack of practical exposure, overemphasis on theoretical learning, limited focus on values, and technological pressures, are also addressed. The article concludes by emphasizing the need for balanced development that integrates knowledge with values, ensuring the preparation of socially responsible and ethically grounded teachers for a better and more sustainable future.

Keywords: Social Commitment, Prospective Teachers, Modern Education, Educational Responsibility, Value-Based Education, Teacher Education, Social Responsibility

Introduction

Education plays a significant role in shaping individuals and society, and teachers occupy a central position in this process. In the contemporary educational context, characterized

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by technological advancement, globalization, inclusiveness, and changing social expectations, the role of teachers extends beyond the transmission of knowledge. Teachers are increasingly expected to function as facilitators, mentors, and socially responsible professionals who contribute to the intellectual, moral, and social development of learners. The National Education Policy 2020 also emphasizes holistic development, value-based education, equity, and the preparation of responsible citizens (Ministry of Education, 2020).

Within this changing educational landscape, social commitment has become an important professional quality for prospective teachers. Social commitment refers to a sense of responsibility towards the welfare of society and a willingness to contribute to social justice, ethical conduct, inclusion, and collective well-being. Prospective teachers, as future members of the teaching profession, are expected to develop not only pedagogical knowledge and technological competence but also empathy, ethical values, and social responsibility. Such qualities enable them to respond sensitively to diverse learner needs and broader social challenges. Therefore, strengthening social commitment during teacher preparation is essential for developing educators who can contribute to a more inclusive, equitable, and socially responsible society (National Council for Teacher Education [NCTE], 2009; UNESCO, 2015).

Concept of Social Commitment

Social commitment is a multidimensional concept that reflects an individual's sense of responsibility and dedication to the welfare of society. It extends beyond personal interests and emphasizes active participation in promoting social justice, ethical conduct, harmony, and collective well-being. In the field of education, social commitment is particularly significant because teachers influence not only students' intellectual growth but also their moral and social development. It may be understood as an individual's willingness to contribute to the common good by responding to societal needs, upholding ethical values, and participating in activities that promote social welfare (UNESCO, 2015).

The concept of social commitment encompasses several interrelated dimensions, including social responsibility, empathy, civic sense, and service orientation (Battistoni, 2017; Westheimer & Kahne, 2004). Social responsibility refers to an individual's commitment to promoting justice, fairness, and the common good through responsible actions (Berkowitz & Bier, 2005). Empathy and ethical values enable individuals to understand the perspectives of others and demonstrate compassion, honesty, respect, and integrity in their interactions (Noddings, 2013). Civic sense encourages responsible citizenship through respect for democratic values, laws, and active participation in community life, while service orientation reflects a willingness to contribute to community welfare without expecting personal gain (Eyler & Giles, 1999). Together, these dimensions cultivate socially responsible individuals who actively contribute to building an inclusive, equitable, and compassionate society.

Teachers, as key agents of socialization, play a crucial role in fostering social commitment among learners by modelling ethical behaviour, promoting inclusiveness, and encouraging responsible citizenship (Bandura, 1977; National Council for Teacher Education [NCTE], 2009). Their influence extends beyond academic instruction to shaping students' attitudes, values, and civic consciousness, thereby contributing to social transformation (Freire, 1970). Consequently, nurturing social commitment among prospective teachers is essential for preparing educators who can effectively respond to contemporary educational and societal challenges while contributing to a just, inclusive, and sustainable society (Ministry of Education, 2020).

Prospective Teachers in Modern Education

The role of prospective teachers has undergone a significant transformation in response to the evolving demands of modern education. Rather than serving merely as transmitters of knowledge, they are expected to function as facilitators, mentors, innovators, and agents of change who promote active learning, critical thinking, and holistic student development (Ministry of Education, 2020; National Council for Teacher Education [NCTE], 2009). Contemporary classrooms require prospective teachers to integrate digital technologies, adopt inclusive pedagogical practices, and foster value-based education that respects learner diversity and promotes equity. These competencies enable them to respond effectively to the academic, social, and emotional needs of learners while preparing students to become responsible and ethical citizens. Consequently, prospective teachers play a pivotal role in building inclusive learning environments and contributing to social transformation through education (UNESCO, 2015).

Dimensions of Social Commitment in Teaching

Social commitment in teaching is reflected primarily through a teacher's commitment to students and commitment to society. Commitment to students involves providing equitable learning opportunities, demonstrating care and empathy, and supporting learners' academic, personal, and emotional development irrespective of their backgrounds or abilities (Noddings, 2013). At the societal level, socially committed teachers promote responsible citizenship, social justice, inclusiveness, and democratic values by encouraging students to respect diversity, think critically about social issues, and contribute positively to their communities (Westheimer & Kahne, 2004; UNESCO, 2015).

Another important dimension is professional commitment, which emphasizes ethical conduct, accountability, continuous professional development, and dedication to high-quality teaching (National Council for Teacher Education [NCTE], 2009). Equally

important is environmental and cultural responsibility, which encourages teachers to foster environmental awareness, sustainable practices, and appreciation for cultural diversity while creating inclusive learning environments. Together, these dimensions enable teachers to serve as socially responsible professionals who contribute to the development of an equitable, inclusive, and sustainable society (Ministry of Education, 2020).

Social Commitment in the Context of Modern Education

Rapid advancements in technology, globalization, and increasing diversity have significantly transformed the educational landscape, making social commitment an indispensable quality for teachers. Modern education requires teachers to integrate digital technologies responsibly, promote inclusive learning environments, and respect the cultural and linguistic diversity of learners. In addition, global educational priorities, such as the Sustainable Development Goals (SDGs), emphasize quality education, equity, and sustainability, thereby reinforcing the need for teachers who are socially responsible and ethically committed (Ministry of Education, 2020; UNESCO, 2015).

In this context, socially committed teachers play a crucial role in addressing contemporary educational and societal challenges through inclusive, equitable, and value-based educational practices. By ensuring equal learning opportunities, promoting ethical values, encouraging respect for diversity, and fostering environmental responsibility, they contribute to the holistic development of learners and the creation of a just, sustainable, and socially responsible society. Thus, social commitment has become an essential professional attribute for teachers in responding effectively to the evolving demands of modern education (National Council for Teacher Education [NCTE], 2009).

Factors Influencing Social Commitment

The development of social commitment among prospective teachers is influenced by teacher education programmes and the institutional environment in which they are trained. Teacher education programmes that integrate professional ethics, value-based education, reflective practice, internships, and community-oriented learning help prospective teachers develop social awareness and a sense of responsibility. Similarly, institutions that promote democratic values, inclusiveness, collaboration, and ethical practices provide an environment that nurtures socially responsible attitudes and behaviours (Ministry of Education, 2020; National Council for Teacher Education [NCTE], 2009).

Family and personal values also play a significant role in shaping social commitment. Family serves as the primary source of moral and social learning, where values such as

empathy, respect, cooperation, and responsibility are first acquired. These values, together with personal qualities such as integrity, altruism, openness to diversity, and a sense of justice, influence prospective teachers' attitudes towards society and strengthen their commitment to ethical and socially responsible professional practice (Bandura, 1977; Noddings, 2013).

Another important factor is exposure to community service and social engagement. Participation in activities such as volunteering, outreach programmes, field visits, and service-learning enables prospective teachers to interact with diverse communities and understand real-life social issues. Such experiences foster empathy, civic responsibility, and a commitment to social welfare, thereby preparing

future teachers to contribute effectively to inclusive and sustainable societal development (Eyler & Giles, 1999; UNESCO, 2015).

Challenges Faced by Prospective Teachers

Prospective teachers encounter several challenges during their professional preparation that may influence the development of their social commitment and teaching competence. One of the major concerns is the limited opportunity for practical exposure through classroom experiences, community engagement, and experiential learning. Although teacher education programmes provide a sound theoretical foundation, insufficient opportunities to apply this knowledge in authentic educational settings may restrict the development of professional competence and social awareness (Darling-Hammond, 2006; National Council for Teacher Education [NCTE], 2009). Furthermore, despite recent educational reforms promoting competency-based and holistic learning, teacher education in many contexts continues to emphasize theoretical achievement and written examinations, which may limit the development of critical thinking, reflective practice, and practical teaching skills (Ministry of Education, 2020).

Another important challenge is the limited emphasis on value-based and ethical education during teacher preparation. Prospective teachers may receive inadequate guidance in integrating values such as empathy, social justice, honesty, and respect into their professional practice. In addition, the rapid integration of digital technologies has increased expectations for technological competence; however, without adequate value orientation, excessive reliance on technology may overshadow meaningful teacher–student interactions and ethical decision-making. Therefore, teacher education programmes should strive to achieve a balanced integration of pedagogical competence, ethical values, and technological proficiency to prepare socially committed teachers for contemporary educational contexts (UNESCO, 2015).

Conclusion

Social commitment is an indispensable attribute for prospective teachers in the context of modern education. As future educators, they are expected to integrate professional competence with ethical values, empathy, and social responsibility to address the diverse needs of learners and the complex challenges of contemporary society. Teacher education programmes, therefore, have a critical responsibility to cultivate these qualities by providing a balanced integration of pedagogical knowledge, technological competence, and value-based education. Developing socially committed teachers not only enhances the quality of teaching and learning but also contributes to building inclusive, equitable, and sustainable communities (Ministry of Education, 2020; National Council for Teacher Education [NCTE], 2009; UNESCO, 2015). Looking ahead, teacher education programmes should place greater emphasis on experiential learning, community engagement, reflective practice, ethical education, and

digital citizenship to prepare future teachers who are capable of responding effectively to emerging educational and societal challenges. By nurturing social commitment as a core professional value, teacher education institutions can prepare educators who serve as catalysts for positive social transformation and lifelong learning.

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A Bibliometric Analysis of Artificial Intelligence in Inclusive Learning Environments

Soumya G *
Dr. Sunil Kumar A. S**

Abstract

Inclusive education is an approach that embraces student diversity as strength and strives to make a learning climate in which all students feel valued and supported. Artificial Intelligence (AI) is revolutionizing the field of education, providing innovative tools and solutions that cater to diverse learning needs and preferences. Through personalized learning platforms, intelligent tutoring systems, and adaptive learning technologies, AI enhances the educational experience for students of all backgrounds. The present study is needed to explore the underlying dynamics of the research domain by examining key aspects such as country-wise contributions, institutional collaborations, and intellectual linkages among publications. The data for this study were collected from Dimensions ai and analysis was done using VOSviewer software. By utilizing bibliometric tools, the study revealed that the research field is characterised by strong international collaboration, clustered institutional partnership, and a well defined yet evolving intellectual structure. Although there remains a need to enhance cross-regional and inter-institutional collaboration to foster a more integrated and diverse research eco system.

Key Words: Inclusive Education, Artificial Intelligence

Introduction

National education policy goals 2020 talks together and in tune to UN sustainable development goals which promises to provide equitable and quality education to all as well as the creation of the situation for lifelong learning by 2030 (Singh, 2023). Inclusion in the context of education is the practice of ensuring all learners regardless of their backgrounds and abilities have an equal chance to have meaningful and quality education in the general schools. Inclusive education can be defined as a wide range of strategies, activities and processes that seek to make a reality of the universal right to quality, relevant and appropriate education (Stubbs, 2008). Inclusive education emphasizes

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creating a supportive and adaptive environment where diversity is respected, valued, and celebrated. Inclusion does not mean the mere physical inclusion of children with special needs in general classrooms, but it involves fostering a sense of belonging and enabling every student to fully engage, contribute, and achieve their potential. Individual differences are considered as strength rather than barriers in inclusive education. Differences in people may likely be seen from a positive perspective. Children with special needs include all the marginalized children from socially, economically, culturally or linguistically marginalized communities and also children with different abilities. Inclusive education is a broader concept of having all these children under the same roof in age appropriate classrooms by respecting and valuing their diversity.

Presently the educational landscape is becoming increasingly heterogeneous. There are students from different cultural, linguistic, socioeconomic, and learning backgrounds in a single classroom. This diversity is simultaneously an opportunity and challenge to educators, who are trying to provide equitable and high quality education to all students. The conventional one-size-fits- all teaching practices are inadequate to meet the diverse needs of learners. To overcome this, teachers must adopt teaching methods that promote inclusive learning environments, ensuring that all students, irrespective of their abilities and backgrounds can achieve. Inclusive education embraces innovative teaching methods to create a diverse and supportive learning environment, promoting equal opportunities and engagement for all students (Mummurthi, 2023).

Inclusive education is an approach that embraces student diversity as strength and strives to make a learning climate in which all students feel valued and supported. Inclusive education is a paradigm change in education because it acknowledges that everyone, regardless of differences, has the right to an equitable and high-quality education (Jardinez & Natividad, 2024). Beyond only a pedagogical strategy, inclusive education is a concept that influences the fundamentals of contemporary education. It is based on the understanding that every student, regardless of background or ability, should have equitable access to high-quality education and that diversity enhances learning opportunities (Bhat, 2023). By tailoring instruction to meet the individual learning needs of students, teachers can enrich their engagement, motivation and achievement. Teaching for diversity means addressing a range of differences in the classroom. It offers exposure to a variety of perspectives which could deepen the knowledge and understanding of students. An inclusive classroom prepares students for a globalized world by enabling them to acquire better communication and cooperation skills. Engaging with different backgrounds breakes down societal steriotypes and prejudices for students. Promoting inclusion helps in the development of values like empathy, tolerance, compassion, etc. which will greatly contribute to the development of interpersonal skills. Besides, inclusive education helps in the socio-emotional growth of

pupils. Inclusive education benefits students by enhancing social development, communication skills, independence, and respect, leading to positive self-esteem, patience, gratitude, and potential for continued education (Luthfia, 2024).

Artificial Intelligence (AI) is revolutionizing the field of education, providing innovative tools and solutions that cater to diverse learning needs and preferences. Through personalized learning platforms, intelligent tutoring systems, and adaptive learning technologies, AI enhances the educational experience for students of all backgrounds. For differently abled children, AI has opened doors to new possibilities, allowing for customized educational plans, accessibility tools, and interactive methods that cater to unique challenges. Most of the innovations in the past decade are related to computers and the internet in the classroom. The next wave will be based on AI or on combination of AI and other technologies (Vincent-Lancrin & Van Der Vlies, 2020). special needs education represents a vital fields where they are particularly essential, supporting instructors in navigating the issues in the diverse classrooms (Khazanchi & Khazanchi, 2024). AI tools have transformative potential in special needs education, offering personalized and adaptive learning experiences for students with diverse abilities. Teaching and learning are transformed when AI is incorporated into the classroom. AI provides current feedback, in addition to personalizing learning, which enhances a more effective and inclusive learning environment (Julien, 2024). AI improves cognition as it provides personalized learning. In addition it encourages teachers to employ more interactive approaches in teaching which could motivate the child in learning.

The integration of Artificial Intelligence (AI) tools and systems has the potential for making an innovative shift in the rapidly evolving educational sector toward equitable learning (Roshanaei, 2023). AI can play a significant role in promoting equity in inclusive education by addressing the diverse needs of students, reducing barriers to learning, and empowering educators to create inclusive environments. Consequently, the strategic utilization of AI tools holds the promise of greatly enhancing both accessibility and the quality of education, thereby fostering more inclusive learning opportunities, especially for marginalized or unprivileged communities. It is anticipated that the capabilities of artificial intelligence will lead to a significant transformation in the educational environments, where personalized learning plans become the norm. This shift will enable a customized approach to teaching that recognizes and accommodates the diverse range of learners present in our communities (Salhab, 2024).

Need and Significance of the Study

In recent years, there has been a steady growth in scholarly publications across various disciplines, leading to an increasingly complex and expansive body of knowledge. This

growth makes it difficult for researchers to systematically understand the development, trends, and intellectual structure of a particular research field. In this context, bibliometric analysis becomes essential as it provides a scientific and quantitative approach to evaluate research output, identify influential contributions, and map patterns of collaboration and knowledge dissemination.

The present study is needed to explore the underlying dynamics of the research domain by examining key aspects such as country-wise contributions, institutional collaborations, and intellectual linkages among publications. By utilizing bibliometric tools, the study helps in identifying leading countries, prominent institutions, and highly influential authors, thereby offering a comprehensive overview of the field. Such insights are particularly important for researchers, academicians, and policymakers to understand the current status and direction of research.

Objectives of the study

1. To analyze the country-wise research collaboration network in the selected domain.
2. To examine the institutional co-authorship patterns and key collaborating organizations.
3. To explore the intellectual structure and major research clusters through bibliographic coupling of documents.

Method adopted in the Study

This study employed a quantitative descriptive method in the form of bibliometric data from articles that have been published. Bibliometrics refers to the quantitative analysis of datasets derived from the statistical examination of various criteria such as authorship, subject area, cited authors, publication details, and sources of citations. It aims to uncover the fundamental dynamics of scientific communication by applying quantitative methods to contexts where scholarly communication occurs, including books, academic journals, and conference or symposium proceedings (Colak & Koc, 2023).

Data Collection Technique

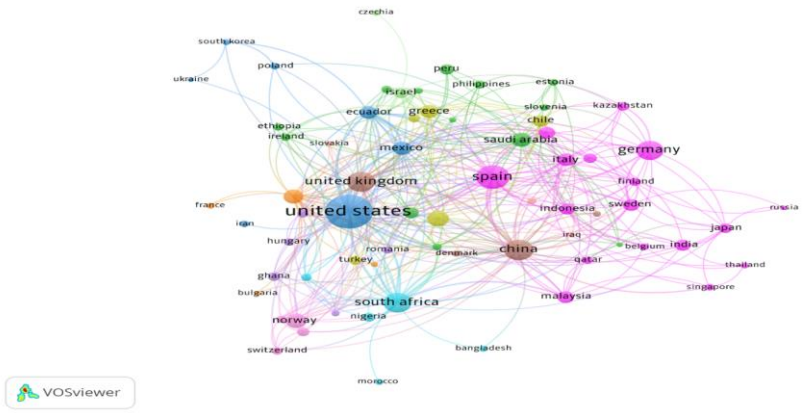
Vosviewer application is used for this bibliometric analysis. Vosviewer helps in the visualization of large bibliometric maps in a manner that facilitates easy interpretation of relationships among data. It offers several key features, including the ability to map different types of bibliometric analyses and compatibility with major bibliographic databases. However, it does not incorporate the time dimension and is generally suited for analyzing small to medium-sized datasets. The tool is designed primarily for text-processing functions and employs layout and clustering techniques to structure data.

Additionally, it provides overlay and density visualization options to enhance the analytical representation (Husaeni et al., 2021). The keyword AI for Inclusive Education was used to collect data sources in the form of research articles from Dimensions ai. Dimensions ai is a linked-research data infrastructure and analytics platform that integrates over 150 million scholarly publications,grants, patents, clinical trials, policy documents, and datasets to map the entire research lifecycle from funding to societal impact. In this search the year of publication was limited to 2020 to 2026. PRISMA method was carried out to screen the research data by stages (a) identification, (b) screening, (c) eligibility, and (d) included.

The primary stage, identification is to search for scientific articles through the dimensions ai page with the keyword "AI for Inclusive Education". 481,812 articles were obtained based on this search result. The next stage screening was carried out by limiting the research articles published during the year 2020 to 2026. The articles that passed this screening stage were 303,492. In research categories only selected 'education' and in field of research only selected 'education, curriculum and pedagogy, education system, and specialist studies in education, so the number of articles reduced to 37,309. In publication type' article' was the eligibility criterion and the number of data decreased to 22,690. In the source title 'frontiers in Education, Education Sciences, Education and Information Technologies, Journal of Diversity in Higher Education, Discover Education, and Teaching and Teacher Education' were only selected as eligible, so the number of data became 2,776. Following the eligibility assessment of articles available under open access and gold publication models were deemed eligible for final inclusion of 1640 articles in the bibliometric synthesis.

Figure 1

Network Visualization of Citation-Countries Analysis Link Map

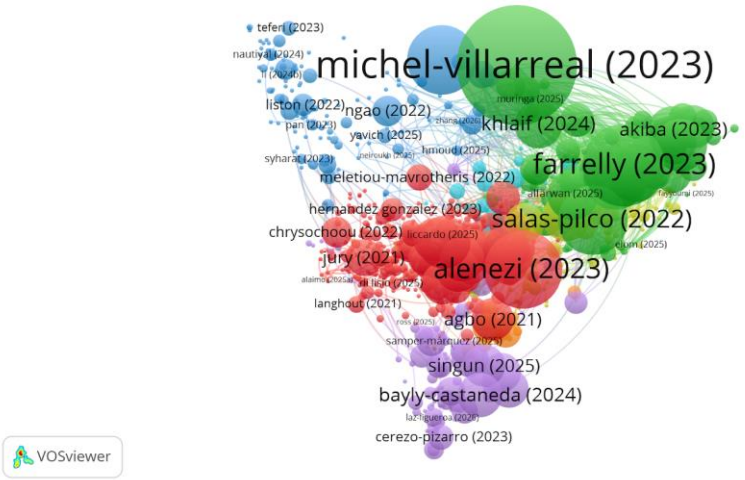


This VOSviewer map visualizes the international co-authorship network in the selected research domain, showing which countries publish most actively and how they

collaborate with each other. Each circle represents a country, and the size of the circle reflects that country's publication output in the dataset; larger nodes such as the United States, United Kingdom, Spain, Germany, China and South Africa indicate higher productivity. The thickness and number of connecting lines between countries depict the strength and frequency of co-authorship relations, so densely connected nodes represent countries that collaborate extensively across borders. Countries are grouped into color-coded clusters, which indicate communities of closely collaborating nations within the broader network. Spatial proximity on the map corresponds to relatedness in collaboration patterns.

Figure 2

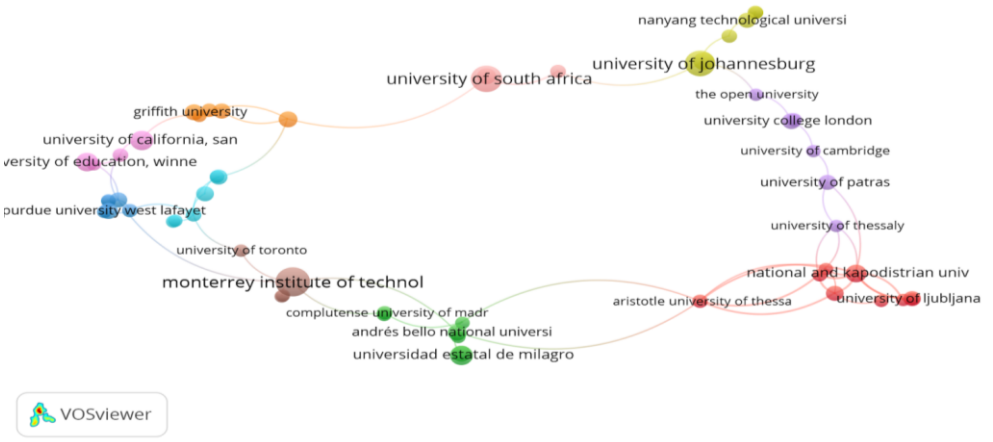
Network Visualization of Bibliometric Coupling



The bibliometric coupling density map identifies key research streams, with a high-density core cluster led by MIchel-Villarel (2003), Farrelly (2023), Salas-pilco (2022), and alenezi (2023) whose publications share extensive cited references- contrasting with peripheral nodes exhibiting weaker coupling to the main network. A dominant green-yellow cluster suggesting a primary research stream where these authors draw from similar prior works. Red-orange extensions forming adjacent groups with partial overlap.

Figure 3

Network Visualization of Co-authorship - organisation



The above figure presents the institutional co-authorship network, where node size corresponds to publication count and link weight to collaboration frequency; dominant clusters highlight University of Johannesburg and Nanyang technological university as key collaboration hubs within a globally distributed research landscape. The University of South Africa and Monterrey institute of technology denote higher research output.

Conclusion

This study reveals the evolving structure of the research domain through country collaboration, institutional partnership, and intellectual linkage among publications. The results reveal that the research field is highly interconnected, and leading countries have significant contributions such as the United States, China, United Kingdom and Spain. These countries play a crucial role in facilitating international collaboration. Still there are emerging contributions from countries like South Africa, India and Saudi Arabia showing the growing globalization and inclusivity of the research domain. At the institutional level, the co-authorship network highlights the presence of different clusters of collaboration with universities such as the University of Johannesburg, University of South Africa, etc. the network also shows that institutional collaborations are relatively localized and cluster based. The bibliographic coupling analysis reveals the intellectual structure of the field. These clusters signify dominant research themes and emerging areas of inquiry. The presence of tightly connected clusters indicates a cohesive knowledge base, while the emergence of newer nodes shows ongoing expansion and diversification of research topics.

On the whole the study clearly shows that the research field is characterised by strong international collaboration, clustered institutional partnership, and a well defined yet evolving intellectual structure. Although there remains a need to enhance cross-regional and inter-institutional collaboration to foster a more integrated and diverse research eco system. Future research should focus on bridging collaboration gaps, encouraging interdisciplinary approaches and supporting underrepresented regions to further enrich the global knowledge network.

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Attitude of Secondary School Teachers towards Online Merge Offline Teaching Approach

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Abstract

The study explores the attitude of secondary school teachers towards the Online-Merge-Offline (OMO) teaching approach, a blended teaching learning model that integrates traditional classroom instruction with learning resources available in online. As educational paradigms shift due to technological advancement and the impact of the COVID-19 pandemic, understanding teachers' perceptions of OMO are crucial for effective implementation in teaching and for policy making. Normative survey method was adopted in this research and the data is gathered using the standardised attitude scale. The sample consisted of 200 secondary school teachers selected using stratified random sampling from government, aided, and unaided secondary schools. Data were collected using the Attitude Scale on Online Merge Offline teaching approach, a standardized instrument developed and validated by the investigator. The findings indicated that secondary school teachers generally had a favourable attitude towards the Online Merge Offline (OMO) teaching approach, reflecting its broad acceptance in the teaching–learning process. A significant difference in attitude was observed based on gender, with male teachers exhibiting more favourable attitudes than female teachers. However, no significant differences were found based on school management or years of teaching experience. The study underscores the necessity of required professional development and the support systems which will optimize benefits of OMO teaching approach.

Key words: Online Merge Offline teaching approach, teacher attitude, technology-integrated teaching

Introduction

The global spread of the COVID-19 Pandemic has had a significant impact on nearly every aspect of life, including education. Because of the difficulty in preventing the disease from spreading further, international leaders have imposed highly harsh

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limitations to interrupt the COVID-19 transmission cycle. World Health Organization-recommended rules, such as social and physical isolation, have presented difficult choices for each country to implement (Singh et al 2021). The Covid 19 epidemic prompted educators to totally overhaul their online teaching and learning methods. As a result, some struggled and faced challenges and high stress levels, whilst others regarded this rapid transformation as an incredible opportunity, coped well, and encouraged good learning activities for their children. Online learning requires self-awareness, time management, technology skills, and cooperative learning, which can be challenging (Rana, 2022). The quick transition of the teaching process to online highlighted the significance of a teaching style fit for this (Adetayo, 2023). The COVID-19 pandemic underlined the need for novel approaches to sustaining education during times of crisis and uncertainty. One such emerging instructional model is the Online Merge Offline (OMO) teaching approach, which combines online and offline learning into a seamless educational experience.

OMO learning relies on hybrid infrastructure and open educational practices to merge online and offline learning spaces together in real-time while teaching students in both environments simultaneously. In OMO learning, teachers must design activities that foster interaction between online and offline students for better learning outcomes. Technology and open educational resources not only assist the learning and teaching processes but also foster communication and interaction among teachers and students, those who are situated in different learning spaces. The goal is to provide authentic and innovative learning experiences and to cater the requirements of students in the post-COVID-19 era. The typical OMO classroom design should include internet availability, interactive boards, sound equipment, cameras, and optional tablet computers for different learning activities (Huang, et al. 2022).

This research defines OMO learning as a learning mode that uses hybrid infrastructure and open educational practices to seamlessly blend online and offline (i.e., physical classrooms) learning spaces in real-time while concurrently educating students in both locations. In this way, the group shares the learning experience by combining two distinct but linked contexts. Furthermore, for improved learning results in OMO learning, the instructor must develop learning activities for increased interaction between online and offline students. This means that, in the ideal context of OMO learning, technology and open educational resources not only support the learning and teaching processes, but also encourage communication and interaction among teachers and students (both online and offline), despite their location in different learning spaces.

The advent of digital technology has revolutionized the education sector by offering innovative teaching-learning strategies that transcend traditional classroom boundaries.

Among these advancements is the Online-Merge-Offline (OMO) teaching approach, a blended learning model that seamlessly integrates in-person instruction with online educational resources. The OMO approach aims to combine the strengths of both modalities, providing a flexible, interactive, and student-centered learning environment. This study analyses the attitude of teachers towards Online-Merge-Offline (OMO) teaching style for instruction and learning that addresses the current needs of education in the post-COVID-19 era. OMO teaching combines open educational techniques with real-time learning environments, both online and offline.

Review of Related Studies

COVID-19 has significantly impacted education, causing teachers to teach the same course twice, online and in-person, to accommodate both stay-at-campus and back-at-home students. This can be time-consuming and exhausting, and dividing students into offline and online classes may reduce class interactivity and efficiency. Safety policies, such as respecting social distancing, may make collaborative learning activities less flexible. UNESCO has launched an initiative to promote research on knowledge and education design in a complex and uncertain world.

Huang et al., (2022) published a paper titled as "Emergence of the Online-Merge-Offline (OMO) Learning Wave in the Post-COVID-19 Era: case study analysis". This paper presents a pilot study of investigating a unique Online-Merge-Offline (OMO) learning mode in China's post-pandemic era. This mode uses Class in X, a smart tool that merges physical classroom space with online space using Open Educational Practices (OEP). It gives flexibility for teachers to teach both online and offline students simultaneously and thereby creating a more dynamic and authentic learning process. This research introduces the Online-Merge-Offline learning paradigm, a method of learning that addresses students' and instructors' new demands in the post-COVID era. OMO makes use of a hybrid infrastructure that integrates both online and offline Open Educational Practices and real-time learning environments. This paper then examines a three-month pilot project in China that investigated OMO learning from three perspectives: space design needs, technology issues, and pedagogical considerations. A qualitative, two-stage study centred on content analysis and a multiple-case study were conducted with 30 teachers and students in the context of English language learning courses. The findings revealed that a comprehensive set of basic and functional competences, including the usage of online platforms, communication skills, class management, and the efficient use of resources, are required.

Yu, et al. (2022) in the work on "Influence of online merging offline method on university students' active learning through learning satisfaction" analyzes differences

between OMO and pure online models using multi-group analysis. The study investigated how the Online Merging Offline (OMO) method influenced university students' active learning by incorporating the Technology Acceptance Model (TAM) and learning satisfaction. Data were collected from 498 university students, and the researchers analysed the data using Partial Least Squares Structural Equation Modelling (PLS-SEM) and Multi-Group Analysis (MGA). The study found that learning excellence, ease of use, expectancy, practicability, and social isolation indirectly affect active learning through learning satisfaction in both OMO and pure online models.

Xiao et al., (2019) conducted a study entitled as "A framework of online-merge-offline (OMO) classroom for open education: A preliminary study". The paper presents an online-merge-offline classroom design for open education, focusing on practical issues of teachers' teaching, students' learning, and schools' management. The design process involves three stages: drafting an OMO classroom framework, building a sample classroom, and exploring end-users' experiences. A classroom with wireless devices, cloud-based services, Internet of Things terminals, ergonomics furniture, and comprehensive data management and analysis services was built at Shanghai Open University. Surveys and interviews with students, teachers, and school managers revealed positive responses to the learning experience, with 90% of students and teachers willing to use the classroom in the future. The classroom design, interaction effects, and effective management were praised by managers. The original OMO classroom serves as a practical example for teachers, students, managers, and researchers in today's open education.

The reviewed studies consistently indicate that the Online Merge Offline (OMO) approach has emerged as an effective post-pandemic instructional model that integrates the strengths of online and face-to-face learning. Huang et al. (2021) established the conceptual significance of OMO, Xiao et al. (2019) proposed a practical framework for its implementation, and Yu et al. (2022) demonstrated its positive impact on learning satisfaction and active learning. Collectively, these studies highlight that the successful implementation of OMO depends not only on technological infrastructure but also on the readiness, competence, and acceptance of its users. However, while existing research has primarily focused on conceptual models and students' learning outcomes, there remains limited empirical evidence on secondary school teachers' attitudes towards the OMO teaching approach, particularly in the Indian context. This gap provides a strong rationale for undertaking the present study. The attitude of teachers towards the OMO teaching approach can significantly influence its adoption and effectiveness. Positive attitude can lead to enthusiastic implementation and innovation, while negative attitude may result in resistance and sub optimal use of available resources. By understanding

their perceptions, concerns, and expectations, this research seeks to identify the factors that facilitate or hinder the acceptance of OMO in secondary education. The findings will provide valuable insights for policymakers, educational administrators, and teacher training programs to develop strategies that support teachers in effectively utilizing the OMO approach.

Research questions

The study discusses the attitude of secondary school teachers towards the online merge offline learning approach which highlights the importance of adopting OMO approach for better learning experience and learning outcomes. The attitude of teachers is important in implementing this novel approach in the teaching learning process. No study is found out the attitude of teachers towards OMO approach so the study answers the following research questions.

RQ 1. What is the level of attitude of secondary school teachers towards OMO approach?

RQ 2. Do specific subsamples such as gender, teaching experience, management type indicate any difference in the attitude of teachers towards OMO?

So, the study is entitled as Attitude of Secondary School Teachers Towards Online Merge Offline Teaching Approach.

Objectives

The following objectives were formulated for the study,

1. To find out the attitude of secondary school teachers towards Online Merge Offline teaching approach.
2. To compare the attitude of secondary school teachers with respect to,

   a. Gender

   b. Type of Management

   c. Years of Experience

Hypotheses

The following hypothesis were formulated by the above objectives.

1. Secondary school teachers have a favourable attitude towards Online Merge Offline teaching approach.
2. There exists no significant difference in the attitude of secondary school teachers towards Online Merge Offline teaching approach with respect to

a. Gender

b. Type of management

c. Years of Experience

Methodology

The success of any research depends upon the suitability of the methods and the tools and techniques, researcher followed to gather data. Methodology of the study deals with the precise explanation of the sample selected, tools and statistical techniques used(Best & Kahn 2016).

Design

The present study adopted the normative survey method under the descriptive research design (Singh, 2006) . The normative survey method was considered appropriate as the study aimed to assess the existing attitude of secondary school teachers towards the Online Merge Offline (OMO) teaching approach and to compare their attitudes with respect to selected variables such as gender, type of school management, and years of teaching experience. Data were collected from a representative sample of secondary school teachers using an attitude scale and analysed to describe the prevailing status and identify differences among various groups.

Sample

The sample for the present study consisted of 200 secondary school teachers working in government, aided, and unaided secondary schools. The participants were selected using the stratified random sampling technique to ensure adequate representation of teachers from different categories of school management and demographic characteristics.The sample included both male and female teachers with varying years of teaching experience. Stratified random sampling enhanced the representativeness of the sample and increased the generalizability of the findings to the target population.

Tool

For the present study, investigator used the Attitude Scale on Online Merge Offline teaching approach. This scale was intended to measure the attitude towards online merge offline teaching approach of secondary school teachers. A 3-point scale was used to measure attitude. The tool was constructed and standardized by the researchers. There are 33 statements in the final scale with 16 negative statements and 17 positive statements. This measure addresses the three components of OMOs such as, Knowledge, communication, and applicability. It was a three-point Likert scale with response options: agree, disagree, and neutral. The attitude scale consisted of positive

and negative statements rated on a three-point scale. Positive items were scored as Agree = 3, Neutral = 2, and Disagree = 1, while the scoring was reversed for negative items. The total attitude score ranged from 33 to 99, with higher scores indicating a more favourable attitude towards the Online Merge Offline (OMO) approach and lower scores indicating a less favourable attitude. The researcher personally administered the attitude scale to the respondents, provided necessary instructions, clarified their queries, and collected the completed responses. The collected data were then tabulated and analysed using appropriate statistical techniques for interpretation.

Statistical Techniques

The collected data were analysed using percentage, mean, median, mode, standard deviation, skewness, kurtosis, independent-samples *t*-test, and one-way ANOVA. Descriptive statistics were used to determine the level and distribution of teachers' attitudes, while the *t*-test and ANOVA were employed to examine differences in attitude based on gender, school management, and teaching experience.

Results and discussions

Preliminary data analysis

A preliminary analysis of the collected data was carried out to examine the distribution and characteristics of the scores obtained from the respondents. Descriptive statistical measures such as the mean, median, mode, standard deviation, skewness, and kurtosis were computed to summarize the data and assess its normality. These statistics provide an overall understanding of the central tendency, variability, and distribution of the respondents' scores on the attitude towards the Online Merge Offline (OMO) teaching approach. Examining these descriptive measures also helps determine whether the data satisfy the assumptions required for the application of appropriate parametric statistical techniques in the subsequent analysis. The results of the preliminary analysis are presented in Table 4.1.

Table 1

Descriptive statistics for the total scores on attitude towards OMO teaching approach

N	Mean	Median	Mode	SD	Skewness	Kurtosis
200	58.6	60	60	8.38	0.163	0.23

The descriptive statistics indicated that the sample consisted of 200 participants (N = 200). The mean score was 58.60 (SD = 8.38), with a median and mode of 60.00. The distribution showed a slight positive skew (skewness = 0.163) and was approximately mesokurtic (kurtosis = 0.230). Since both skewness and kurtosis values were within the acceptable limits (±1), the data were considered approximately normally distributed, supporting the use of parametric statistical procedures.

Objective 1

Secondary school teachers' attitude towards online merge offline teaching approach.

The attitude towards online merge offline teaching approach of secondary school teachers grouped into high, average and low according to the formula M+SD (High), Between M+SD and M-SD (Average) and M-SD (Low) respectively.

Table 2

Secondary school teachers attitude levels towards online merge offline teaching approach

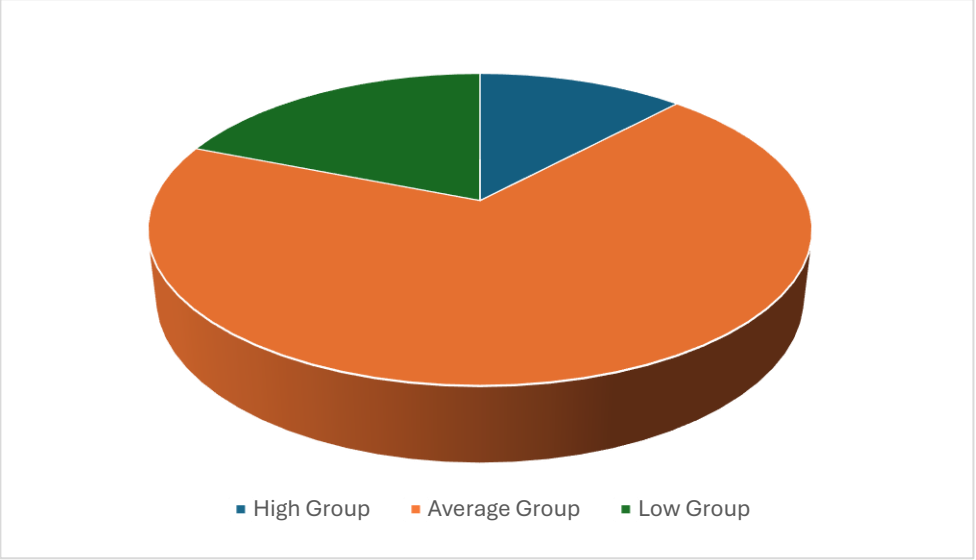
Attitude towards OMO	Range of scores	Level of attitude	Number of teachers	Percentage
High Group	(M + SD) 66.98 above	Favourable	24	12
Average Group	(Between M + SD and M - SD) 50.22 - 66.98	Moderately favourable	138	69
Low Group	(M - SD) 50.22 below	Unfavourable	38	19

It is evident from Table 2 that 69 percent of teachers have a moderately favorable attitude towards online merge offline teaching approach. Whereas 12 percent teachers have highly favorable attitude towards online merge offline teaching approach and 19% of teachers have unfavorable attitude towards online merge offline teaching approach. The hypothesis formulated is that secondary school teachers have favorable attitudes towards on online merge offline teaching approach. Hence, the hypothesis, is accepted.

Level of attitude teachers towards online merge offline teaching approach graphically represented as in Figure 1

Figure 1

Graphical representation of level of attitude of teachers towards online merge offline teaching approach (Percentage)



Objective 2

To compare the attitude of secondary school teachers with respect to the sub samples Gender, Type of Management, Years of Experience.

The hypothesis formulated is that there exists no significant difference in the attitude of secondary school teachers on Online Merge Offline teaching approach with respect to Gender, Type of Management, Years of Experience.

Analysis of attitude secondary school teachers on Online Merge Offline teaching approach based on subsample gender Male and Female

The results obtained after the data was analysed using t test are given below

Table 3

The attitude of secondary school teachers towards online merge offline teaching approach based on gender

Variable	Gender	N	Mean	SD	t-Value	P value
Attitude towards OMO	Female	157	58	8.09	2.09	P<0.05
	Male	43	61	9.08		

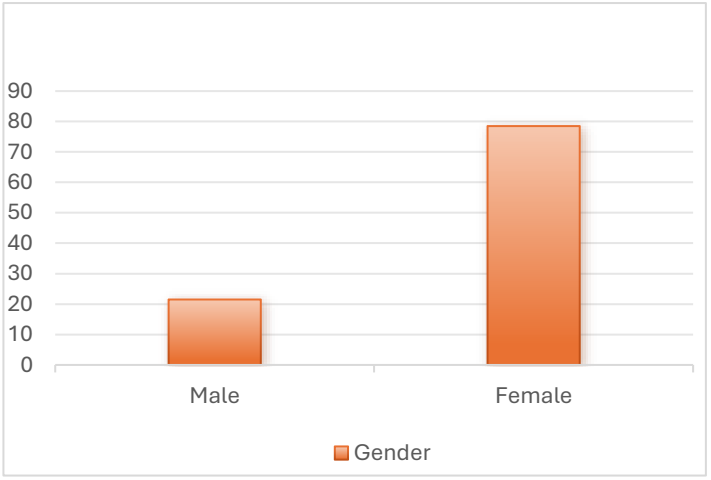
The mean score for the attitude towards OMO based on subsample gender male and female are 61 and 58 respectively. The value of standard deviation found to be 9.08 and 8.09 respectively.

The t value for the subsample based on gender 2.09. is greater than the table value of 1.96 at 0.05 level. This indicates the existence of significant difference in their attitude towards online merge offline teaching approach of between male and female teachers at secondary level. Hence, the hypothesis is not accepted. As the mean value of male teachers is more than that of female teachers it can be inferred that male teachers have more favorable attitude towards OMO approach

The attitude of secondary school teachers towards online merge offline teaching approach with respect to gender is graphically represented as in Figure 2

Figure 2

Graphical representation of attitude of secondary school teachers towards online merge offline teaching approach based on gender



Analysis of attitude secondary school teachers on Online Merge Offline teaching approach based on sub sample type of Management: Government, Aided and Unaided

The data obtained was analysed using 'ANOVA' and the results are given below.

Table 4

Attitude of secondary school teachers towards online merge offline teaching approach based on type of management.

Variable	Type of Management	N	Mean	SD	df_1	df_2	F-Value
Attitude towards OMO	Aided	113	58.5	8.74	2	197	0.0248
	Government	50	58.8	8.23			
	Unaided	37	58.6	7.63			

Above table shows that the mean score of aided, government and unaided teachers are 58.5, 58.8 and 58.6 respectively. The standard deviation of aided, government and unaided teachers found to be 8.74, 8.23 and 7.63 respectively.

The F value is found to be 0.0248 which is less than the table value 3.0417, So there is no significant difference in the attitude of secondary school teachers on online merge offline teaching approach with respect to type of management. Hence, the hypothesis is accepted.

Analysis of attitude of secondary school teachers on Online Merge Offline teaching approach based on sub sample Years of Experience: Below 10 years, 10- 20 years and Above 20 years

The data obtained was analyzed using 'ANOVA' and the results are given below.

Table 5

Attitude of secondary school teachers towards online merge offline teaching approach based on years of experience.

Variable	**Years of Experience**	**N**	**Mean**	**SD**	**df_1**	**df_2**	**F-Value**
Attitude towards OMO	Below 10 Years	76	58.8	8.61	2	197	0.0275
	10 – 20 Years	81	58.1	8.59			
	Above 20 Years	43	59.3	7.66			

Above table shows that the mean score of teachers with years of experience below 10 years,10-20 years and above 20 years are 58.8, 58.1 and 59.3 respectively. The standard deviation of teachers with years of experience below 10 years,10-20 years and above 20 years are found to be 8.61, 8.59 and 7.66 respectively.

The F value is found to be 0.275 which is less than the table value 3.0417, So there is no significant difference in the attitude of secondary school teachers towards online merge offline teaching approach with respect to years of experience. Hence, the hypothesis is accepted.

Major findings

The present study examined the attitude of secondary school teacjers towards Online Merge Offline (OMO) approach. Based on the analysis of the collected data, the following major findings were obtained.

1. Overall Attitude towards the OMO Approach

The findings indicate that secondary school teachers possess a moderately positive attitude towards the Online Merge Offline (OMO) teaching approach. This favourable attitude may be attributed to the increasing adoption and integration of the OMO approach in the teaching–learning process, enabling teachers to combine the advantages of both online and face-to-face instruction.

2. Level of Attitude towards the OMO Approach

The distribution of teachers based on their attitude levels revealed that 69% of the secondary school teachers exhibited a moderate level of attitude towards the OMO approach. In comparison, 12% demonstrated a high level of attitude, while 19% showed a low level of attitude. The predominance of teachers in the moderate and high attitude categories indicates that the majority of secondary school teachers hold a favourable attitude towards the Online Merge Offline teaching approach.

3. Gender-wise Difference in Attitude

The analysis revealed a statistically significant difference in the attitude of secondary school teachers towards the OMO approach based on gender. Male teachers obtained a higher mean attitude score than female teachers, indicating that male teachers possess a more favourable attitude towards the OMO approach. Thus, gender was found to be a significant factor influencing teachers' attitudes towards Online Merge Offline teaching.

4. **Management-wise Difference in Attitude**

The study found no statistically significant difference in the attitudes of teachers working in government, aided, and unaided secondary schools towards the OMO approach. This finding suggests that teachers across different types of school management exhibit similar and positive attitudes towards Online Merge Offline teaching. Therefore, school management does not appear to influence teachers' attitudes towards the OMO approach.

5. Difference Based on Teaching Experience

The analysis also indicated no statistically significant difference in teachers' attitudes towards the OMO approach with respect to their years of teaching experience. Teachers with varying lengths of professional experience demonstrated comparable attitudes towards the OMO teaching approach. This suggests that teaching experience does not significantly affect teachers' acceptance or perception of the OMO approach.

Conclusion

The study indicates that teachers have a moderate to favorable attitude towards OMO approach. Gender difference affecting teachers' attitudes towards OMO approach, and male teachers have more favorable attitude towards OMO approach than female teachers. The attitude of secondary school teachers towards online merge offline teaching approach does not vary with the type of schools that is govt, aided and unaided and the experience they have acquired. OMO enables increased communication, resource sharing and improved practice for achievement of better learning experience. Implementation of online merge offline teaching approach should be promoted in classrooms to attain understanding the practice of online merge offline resources as well as active participation and autonomy of students in classrooms.

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Evaluating Prospective Teachers' Perceptions of Multidisciplinary Curriculum Integration in ITEP

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Suchithra. P.M**

Abstract

The Integrated Teacher Education Programme (ITEP), introduced under the National Education Policy (NEP) 2020, emphasizes multidisciplinary and holistic education for preparing competent and reflective teachers. The present study examines the perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP. The study focused on prospective teachers' awareness, classroom implementation experiences, perceived benefits, institutional support and readiness towards multidisciplinary teaching practices. The study employed survey method with a descriptive research design. A sample of 140 prospective teachers was selected using stratified random sampling technique. The study employed a self-structured questionnaire. The collected data were analyzed using, mean, standard deviation, percentage analysis and gender comparison through independent sample t-test. The findings revealed that prospective teachers generally possess positive perceptions towards multidisciplinary curriculum integration in ITEP. The respondents agreed that multidisciplinary learning enhances classroom engagement, creativity, critical thinking, problem-solving ability and real-life application of knowledge. The study also found that prospective teachers feel more professionally prepared and confident in implementing integrated teaching practices. However, concerns regarding faculty preparedness, training opportunities, time allocation, assessment practices and maintaining focus on major teaching subjects were also identified. The study concludes that multidisciplinary curriculum integration in ITEP has significant potential to strengthen holistic teacher education in alignment with the vision of NEP 2020. Effective implementation requires

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continuous institutional support, faculty development and practical exposure to integrated teaching practices.

Keywords: NEP 2020, Multidisciplinary Curriculum, ITEP, Prospective Teachers, Curriculum Integration.

Introduction

The twenty-first century demands teachers who can integrate knowledge across disciplines, promote critical thinking and provide holistic learning experiences. In response to these needs, the National Education Policy (NEP) 2020 introduced major reforms in the Indian education system, emphasizing multidisciplinary and integrated learning. One of its key initiatives is the Integrated Teacher Education Programme (ITEP), a four-year programme aimed at developing professionally competent, socially responsible and innovative teachers (Ministry of Education, 2020).

Multidisciplinary curriculum integration links concepts and competencies across subjects to foster relevant, context-based learning. Unlike traditional teacher education Programmes that focus on isolated subject teaching, ITEP encourages interdisciplinary understanding, experiential learning and flexible pedagogical practices (Ministry of Education, 2020).

The effectiveness of multidisciplinary curriculum integration depends largely on the perceptions and readiness of prospective teachers. Positive perceptions can support successful implementation, while negative attitudes may create challenges (Shriner et al., 2010). Therefore, it is important to understand the views of prospective teachers regarding multidisciplinary curriculum integration in ITEP.

The present study aims to examine the perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP and identify the opportunities and challenges associated with its implementation.

Need and Significance of the Study

NEP 2020 envisions a transformative approach to teacher education by introducing multidisciplinary and holistic learning practices. Since ITEP is a newly introduced programme, there is a need to understand how prospective teachers perceive multidisciplinary curriculum integration. Prospective teachers are the future implementers of educational reforms and their perceptions significantly influence classroom practices.

The study is significant because it provides insights into the readiness, awareness and challenges faced by prospective teachers in implementing multidisciplinary teaching

approaches. The findings may help curriculum planners, teacher educators and policymakers strengthen the implementation strategies of ITEP. It may also contribute to improving faculty training, curriculum design and institutional support systems for effective multidisciplinary integration.

Literature Review

Nath (2026) conducted a mixed-method study to examine teacher educators' perspectives on multidisciplinary initiatives in teacher education. The sample consisted of 50 teacher educators selected through purposive sampling technique. The findings revealed that teacher educators strongly supported multidisciplinary curriculum integration and believed that it enhances collaborative learning and pedagogical innovation.

Sonakawade et al. (2026) conducted a qualitative document analysis which examined the alignment of M.Ed. curricula with NEP 2020 principles. The researchers analyzed curriculum documents of two universities using purposive sampling technique. Data were collected through curriculum mapping and content analysis tools. The findings revealed that multidisciplinary integration, ICT incorporation and inclusive pedagogical practices were better represented in the curriculum two universities. The study emphasized the need for stronger practicum experiences and diversified assessment practices to effectively implement multidisciplinary education.

Alam (2024) conducted a review study on Impact of NEP 2020 on ITEP Implementation which examined the transformative impact of NEP 2020 on teacher education through the implementation of ITEP. The study adopted a qualitative review methodology using policy analysis and document review techniques. Secondary data were collected from policy documents, research articles and institutional reports related to ITEP implementation. The findings revealed that multidisciplinary approaches, experiential learning and integrated pedagogical practices are central features of ITEP.

Singh et al. (2024) conducted a conceptual and analytical study of curriculum innovation and interdisciplinary learning under NEP 2020. The researchers adopted document analysis methodology by examining educational policy documents, curriculum frameworks and existing research literature. The study highlighted that multidisciplinary curriculum integration encourages creativity, critical thinking and problem-solving abilities among learners. However, the study identified challenges such as lack of teacher training and rigid assessment practices.

Maity (2024) carried out a theoretical and analytical study of curriculum reforms in teacher education after NEP 2020 which examined curriculum reforms proposed under

NEP 2020 in teacher education. The study employed document analysis methodology using policy reports, curriculum frameworks and educational literature as sources of data. The findings showed that multidisciplinary exposure, learner-centred pedagogy and competency-based learning are major features of the revised teacher education curriculum. The study concluded that integrated teacher education programmes can improve teaching effectiveness and promote holistic professional development among future teachers.

The reviewed studies indicated that multidisciplinary curriculum integration is an essential component of NEP 2020 and ITEP. The studies consistently reported that interdisciplinary learning enhances creativity, critical thinking, collaborative learning and professional competency among prospective teachers. The review established the need for empirical studies examining the perceptions of prospective teachers towards multidisciplinary curriculum integration.

Objectives

1. To examine the level of perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP.
2. To examine whether prospective teachers possess positive perceptions towards multidisciplinary curriculum integration in ITEP.
3. To find out the significant difference in the mean score of perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP based on Gender.

Hypotheses

1. There exists no significant difference in the level of perceptions among prospective teachers towards multidisciplinary curriculum integration in ITEP.
2. Prospective teachers do not possess positive perceptions towards multidisciplinary curriculum integration in ITEP.
3. There exists no significant difference in the mean score of prospective teachers in their perceptions towards multidisciplinary curriculum integration in ITEP based on Gender.

Methodology

The present study employed the survey method with a descriptive research design to examine the perceptions of Multidisciplinary Curriculum Integration in the Integrated Teacher Education Programme (ITEP) among prospective Teachers in Teacher Education Institution of Palakkad District.

Research Design

A descriptive research design was selected to systematically analyze prospective teachers perceptions on Multidisciplinary Curriculum Integration in the Integrated Teacher Education Programme (ITEP)

Population and Sample

The target population comprises 140 prospective teachers enrolled in Teacher Education Institution of Palakkad District. A stratified random sampling method was employed to select the sample.

Tool used for the Study

A self-structured questionnaire was designed to measure the prospective teacher s perceptions towards multidisciplinary curriculum integration in the Integrated Teacher Education Programme (ITEP). The tool consisted of statements covering different dimensions such as perceptions towards multidisciplinary curriculum integration, perceived benefits and challenges faced in implementing multidisciplinary teaching practices. A three-point Likert scale was used for recording responses, ranging from Agree to Disagree.

Statistical Techniques Used

The collected data were analyzed with,

- Mean
- Standard deviation
- Percentage analysis
- Independent sample t-test

RESULTS AND DISCUSSION

Table 1

Descriptive Statistics of Perceptions towards Multidisciplinary Curriculum Integration In ITEP

Descriptives					
	Gender	Total.	Mean.	Median.	Standard Deviation
N	140	140.	75.4	76.0	6.24
Minimum		54			
Maximum		84			

The table 1 presents the descriptive statistics of respondents' perceptions towards multidisciplinary curriculum integration in ITEP. A total of 140 respondents were included in the analysis. The mean score was 75.4, with a median of 76.0 and a standard deviation of 6.24. The minimum score was 54, while the maximum score was 84.

Discussion of Results

The Mean, Median and Standard Deviation for Perceptions of Prospective Teachers towards Multidisciplinary Curriculum Integration found to be 75.4, 76.0 and 6.24 respectively. The mean score of 75.4 indicates that prospective teachers possess positive perceptions towards multidisciplinary curriculum integration in ITEP. The median value of 76.0 further confirms the consistency of responses. The standard deviation value of 6.24 shows moderate variability among respondents. The minimum and maximum scores indicate that perceptions ranged from moderately low to highly positive.

Table 2

Level of perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP.

Level	Norms	Value	Sample Size	Percentages
High	M+SD and above	81.64	37	26.42%
Average	M-SD and M+SD		78	55.71%
Low	M-SD and below	69.16	25	17.85%
Total.			140.	100

The table 2 presents the level of perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP. Out of 140 respondents, 37 (26.42%) had a high level of perception, 78 (55.71%) had an average level of perception, and 25

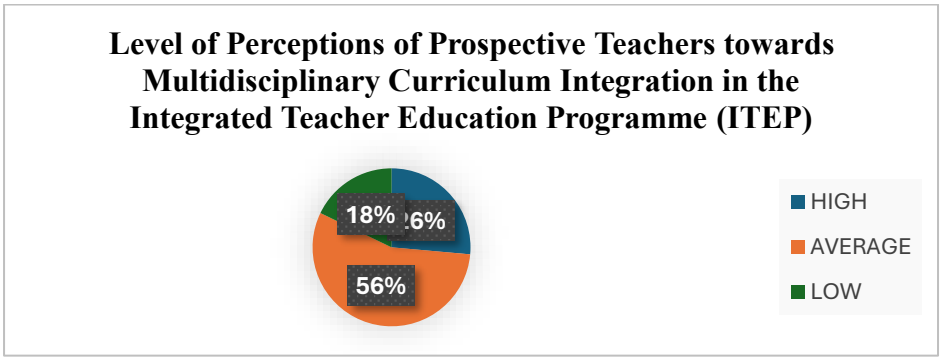
(17.85%) had a low level of perception. The total sample consisted of 140 respondents (100%).

Discussion of Results

The analysis reveals that 55.71 % of the prospective teachers possess average level perceptions towards multidisciplinary curriculum integration, while 26.42 % are observed within high level perceptions. 18% possess low level perceptions. The findings indicate that the majority of prospective teachers hold favourable and moderate perceptions towards multidisciplinary curriculum integration.

Figure 1

Diagrammatical Representation of Level of perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP.



The figure 1 presents the diagrammatical representation of the level of perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP. It shows that 56% of the prospective teachers have an average level of perception, 26% have a high level, and 18% have a low level of perception.

Table 3

Comparison of perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP based on Gender.

Variable of the study	Gender	N	Mean	Standard Deviation	t	p
Perceptions of Prospective Teachers	Female	130	75.4	6.31	0.019	.985
	Male	10	75.4	5.64		

The table 3 presents the comparison of perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP based on gender. The mean perception score for both female (75.4) and male (75.4) prospective teachers was the same. The standard deviation was 6.31 for females and 5.64 for males . The obtained t-value was 0.019 with a p-value of 0.985.

Discussion of Results

The results of descriptive statistics reveal that the mean score of perception of female prospective teachers was 75.4 and SD was 6.31respectively, while the mean score of male prospective teachers was also 75.4 and SD was 5.64 respectively. This indicates that both male and female prospective teachers possessed almost equal levels of perception towards multidisciplinary curriculum integration in ITEP.

The results of the independent sample t-test showed that the obtained p-value for the total perception scores was 0.985, which is greater than the significance level of 0.05. Hence, there is no statistically significant difference between male and female prospective teachers in their perceptions towards multidisciplinary curriculum integration in ITEP. Therefore, the null hypothesis, "There exists no significant difference between male and female prospective teachers in their perceptions towards multidisciplinary curriculum integration in ITEP," is accepted.

Major Findings of the Study

1. The study revealed that mean score on perception 75.4 indicates that prospective teachers show a positive perception towards integrated and interdisciplinary teaching practices.
2. Majority of the respondents 56% demonstrated average level perceptions towards multidisciplinary curriculum integration.
3. Strong acceptance of multidisciplinary learning approaches shows high level perceptions of 26% of the respondents
4. 18% of the respondents possess low level perceptions towards curriculum integration.
5. The independent sample t-test result showed that there exists no significant difference between male and female prospective teachers in their perceptions towards multidisciplinary curriculum integration in ITEP.
6. The study found that multidisciplinary curriculum integration enhances critical thinking and problem-solving ability among prospective teachers.

7. The study revealed that prospective teachers feel professionally prepared and confident to handle diverse classroom situations through integrated teaching practices.
8. The study revealed that existing assessment practices are not fully suitable for evaluating integrated and interdisciplinary learning outcomes.
9. The findings support the vision of NEP 2020, which emphasizes holistic, multidisciplinary and competency-based teacher education.

Educational Implications of the Study

1. Teacher education institutions should provide adequate practical exposure to multidisciplinary teaching practices.
2. Faculty development Programmes should be organized to strengthen interdisciplinary pedagogical competencies among teacher educators.
3. Curriculum planners should ensure balanced integration of disciplinary depth and interdisciplinary learning experiences.
4. Assessment practices need to be redesigned to evaluate creativity, critical thinking and collaborative learning.
5. Institutions should provide supportive infrastructure and collaborative learning environments for successful implementation of ITEP.
6. Workshops, seminars and training Programmes should be conducted to improve awareness regarding multidisciplinary education.

Conclusion

The present study examined the perceptions of prospective teachers towards multidisciplinary curriculum integration in ITEP. The findings revealed that prospective teachers hold favourable perceptions towards integrated and interdisciplinary learning approaches promoted under NEP 2020. The respondents acknowledged the role of multidisciplinary education in enhancing creativity, critical thinking, collaboration and professional competence. At the same time, certain challenges related to faculty preparedness, assessment practices and institutional support were identified. Effective implementation of multidisciplinary curriculum integration requires continuous professional development, adequate infrastructure, curriculum flexibility and experiential learning opportunities. The study concluded that multidisciplinary curriculum integration in ITEP has immense potential to strengthen holistic teacher education and

prepare future teachers capable of addressing diverse educational needs in the twenty-first century.

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