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The Role of Artificial Intelligence and ICT in Enhancing Student Well-Being and Academic Engagement

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Abstract

The use of Artificial Intelligence (AI) and Information and Communication Technology (ICT) in education is opening up new opportunities to enhance students' wellbeing and engagement in learning. The study is aimed at exploring the impact of AI tools supporting education and ICT environment on students' emotional state, motivation to learn, active involvement in the classroom, and educational motivation. The use of AI-powered personalized learning systems, intelligent tutoring applications, digital feedback mechanisms, and interactive learning platforms can help address individual learning needs, foster active engagement, and offer prompt academic support. Likewise, ICT provides flexibility in accessing of educational materials, learning together and exchanging information among students and teachers. While the benefits of digital technology can enhance student learning, overuse of digital devices, digital fatigue, privacy concerns, dependence on technology, and inequity in access to technology may negatively impact student well-being and learning. The research underscores the need to embrace the integration of AI and ICT using student-centred, inclusive, and ethical educational practices. It stresses the importance of technology being a tool that supports and does not supplant relationships between teachers and students and appropriate emotional support. The study suggests that, with the support of digital competence, responsible use of ICTs and institutional guidance, the use of AI and ICT can play a role in making learning more engaging, supportive and accessible. These insights can inform technology-infused strategies in the classroom and at school that foster student well-being and learning.

Keywords: Artificial Intelligence, Information and Communication Technology, Student Well-Being, Academic Engagement, Digital Learning, Personalized Education, Educational Technology

Introduction

The use of artificial intelligence (AI) and information and communication technology (ICT) has become a major influence on practice in education, impacting how pupils access information, engage with teachers, experience learning activities and manage their learning tasks. The age of digital learning platforms, intelligent tutoring systems, AI-powered learning applications, virtual classrooms, and personalised learning tools has opened the doors to a flexible, interactive, and tailored education experience. In addition to enhancing teaching, these technologies can also support student wellness and learning engagement by giving timely feedback, promoting communication, and aiding students in resolving challenges in the learning process. They are, however, effective only when they are implemented in the educational setting in a way that is appropriate and meets the educational, emotional and social needs of students.

A component of educational development, student well-being is crucial as it acts on students' motivation, confidence, relationships, and meaningful engagement in education. Emotional stability, a sense of belonging, and adequate academic support tend to better equip students to manage educational challenges and educational engagement. Academic engagement involves behaviors, thoughts, and emotions that are invested in the learning process. These dimensions are interrelated in the sense that students' desire to engage with the class activities might be affected by their interest in the course, confidence in their ability and their perceptions of the learning environment. Therefore, schools should take into account the wider experiences that contribute to pupils' learning and personal development, as well as their academic success.

Artificial intelligence can provide students with a number of opportunities to help with these aspects of student growth. AI-powered learning systems can analyze learning behaviors, pinpoint problem areas, guide learners to suitable learning materials, and give feedback based on specific results. Guided explanations provided by an intelligent tutoring system can aid students in grasping complex concepts, and

conversational agents can provide instant support for academic queries. These can enhance the self-directed nature of learning and decrease some of the frustrations of traditional learning. AI-assisted learning has also been found to lead to improvements in behavioral, cognitive, and emotional involvement to varying extents depending on the application, learning context, and implementation (Heung & Chiu, 2025).

Information and communication technology (ICT) supports AI by enabling the digital systems that facilitate learning, communication, collaboration, and student support. The use of learning management systems, online discussion forums, video-conferencing applications, digital libraries, collaborative platforms, and more enables students to engage in educational experiences outside of the traditional classroom setting. These technologies can enhance the accessibility of learning materials, support interactions between students and teachers, and enable student-to-student interactions. ICT can be a helper in developing more responsive learning environments, where resources and feedback are customised to students' learning needs, when combined with AI-based applications. However, the use of technology is not enough to ensure engagement. Issues such as the quality of instructional design, digital accessibility, teacher preparedness, and students' effective use of technology are still pertinent.

Even with these advantages, there is a need to explore the relationship between AI, ICT and student well-being carefully. When used for the wrong purposes, technology can have adverse impacts on students' learning, including that of excessive screen time, digital fatigue, information overload, privacy concerns, technological dependence, and reduced face-to-face interaction. In the same way, children who have poor access to the internet, the right devices, or are not tech-savvy enough may struggle with technology-based learning. A study on the impact of AI on students' well-being suggests a balance between the advantages of technology and issues of psychological well-being, social engagement, and responsible use of technology (Klimova & Pikhart, 2025).

Thus, the educational institutions need to take a student-centred approach that emphasizes accessibility, ethical implementation, human interaction, and appropriate support. Moreover, the connection between student well-being and learning engagement could not be the same in all schools. Age, socioeconomic status, learning style, institutional resources, academic load, and prior experience with digital technologies could all impact students' reactions to AI and ICT-integrated learning. While some emerging studies show promise of enhancing engagement through AI tools, there are concerns about excessive dependence, the lack of critical thinking, and the inconsistent emotional impact they have, meaning that not all AI tools would be considered a universally positive influence on engagement (Lo et al., 2024).

It is important to understand these differences in order to determine the contexts in which technology can be of educational and psychological value.

In this context, the present research paper "The Role of Artificial Intelligence and ICT in Enhancing Student Well-Being and Academic Engagement" will explore how AI-powered applications and ICT-based learning practices could support students' overall well-being and engagement in learning. It acknowledges the potential of these technologies for the goals of personalised learning, academic motivation, learner confidence, communication, and access to educational assistance, and addresses the challenges of these technologies. The study also underscores the significance of responsible technology integration and the complementary nature of the role of teachers, institutional support systems and digital learning resources. The research aims to present a balanced view of the potential of AI and ICT in education, considering both the possibilities and challenges, to help create more inclusive and engaging learning environments that are focused on the student.

Background of the study

Artificial Intelligence (AI) and Information and Communication Technology (ICT) in education has opened up new avenues to the possibility of making learning environments more inclusive, interactive and student-centred. Standardised curricula and assessments that use a single method of instruction and evaluation might not be as effective as they could be if they catered to the unique needs, emotions, learning styles and life experiences of individual pupils. Digital technologies have the potential to provide opportunities to meet these differences by adapting and personalizing learning experiences, providing timely feedback to students, enabling flexible learning materials, and enhancing student-teacher communication. The use of AI and ICT in the education sector goes beyond the scope of academic achievement to helping students' mental health, motivation, engagement in learning and general learning experiences.

The significant role AI plays in educational technology highlights its potential to drive innovation, enhance student learning, and assist teachers in effectively addressing learning challenges and differences. AI-enabled educational platforms can recommend learning materials according to students' progress, offer immediate explanations, and provide additional assistance when learners experience difficulties with particular concepts. Intelligent Tutoring Systems and chatbots can also foster self-directed learning by enabling students to ask questions and practice at their own speed. These applications can, if used

responsibly, help overcome some learning barriers and build student self-confidence and opportunities for more meaningful academic activity. Their success, however, will be dependent on proper instructional design, quality of digital resources, access to the technology, and continued involvement of teachers.

The use of the Information and Communication Technology is also a key factor in creating the modern educational experience. The adoption of learning management systems, virtual classrooms, educational applications, online discussion forums, digital libraries and collaborative platforms allows students to access learning materials and interact with teachers and fellow students, even outside of the classroom setting. Such technologies can include flexible learning opportunities, facilitate collaborative learning with peers and create multiple learning opportunities for students to access academic content. ICT supported learning environments can be better suited for students needing extra time to learn, accessible instructional materials, or different ways to engage in the learning process. However, the advantages of digital learning are not uniform, as variations in access to the internet, devices, digital literacy and home learning environments can affect student participation and effectiveness.

There is a need to focus on the well-being of students as well as academic achievement as essential aspects of educational quality. It includes students' emotional, psychological, social and academic experiences and covers their sense of belonging, self-confidence, motivation, stress management and satisfaction with the learning environment. Students under intense academic strain, struggling to understand what they are learning, feeling isolated or lacking in learning support may report low levels of motivation and disaffection. AI-powered learning systems could contribute to solving some of these issues by providing customised educational support, catching learning challenges, and offering immediate feedback. But technology is not the answer to the root of student issues, and it shouldn't take the place of good teacher/child, counsellor/child and peer relationships. The recent study on AI and student well-being underscores the promise of technology-mediated support as well as the risks of social isolation, dependency, and anxiety.

Academic engagement is a multidimensional construct that is manifested behaviorally, cognitively and emotionally in learning activities. Behavioural engagement includes attendance, participation in class, completion of tasks and persistence; cognitive engagement includes concentration, critical thinking, self-regulation and the effort put into gaining understanding of concepts; emotional engagement includes interest, enthusiasm, confidence and feeling connected with the learning process. These dimensions can be impacted by AI and ICT in various ways. Digital resources that are interactive could foster engagement, adaptive learning platforms could address the individual needs of students, and AI-driven feedback could assist students in pinpointing areas for improvement and deepening understanding. However, the impact of these technologies on learning will only be realized when they are implemented in the classroom. In 2025, a systematic review revealed that the use of ChatGPT in learning can enhance multiple aspects of student engagement, alongside highlighting potential pitfalls of over-dependence and disengagement.

Even though, the incorporation of AI and ICT in education still has great challenges. Too much screen time, overload of information, privacy issues, algorithmic bias, unequal access to digital infrastructure, and inaccurate information generated by artificial intelligence can have a negative impact on students' learning experiences. Students can also get too used to relying on automated support and not practice the skills of independent thinking and problem-solving. In addition, digital monitoring and predictive analytics should also be used with caution to avoid inaccurate labels and inappropriate interventions for students. Schools and universities should thus have clear guidelines on data protection, responsible use of AI, accessibility, academic integrity, and the ethical handling of student data. Technology integration should enhance teacher guidance, foster critical thinking, and maintain human relationships that promote a positive learning climate.

In this context the importance and the timeliness of studying the potential of Artificial Intelligence (AI) and ICTs to improve student well-being and engagement in learning are very meaningful. While technology-supported learning, AI-based personalisation and student engagement have already been studied, there is a need to intensively explore how these technologies relate to students' overall wellbeing in a context-sensitive way. In recent systematic reviews, the impact of AI on engagement and psychological outcomes is also not consistently positive, and may be contingent on the type of AI, the pedagogy, and the level of education and student demographics.

Therefore, the aim of the present study is to explore the role of AI and ICT in fostering students' wellbeing and academic engagement, and to acknowledge the opportunities and challenges that come with using AI and ICT. It seeks to determine if technology-enhanced learning environments are correlated with greater levels of motivation, engagement, learning self-efficacy, emotional reactions and academic involvement. This study also highlights the need for responsible implementation, equitable access, digital competence, and teacher support to ensure the maximisation of the educational value. The study's findings could have implications for practitioners, administrators, and policy makers who would like to create learner-centered inclusive and engaging learning spaces that are digital.

Justification

The introduction of Artificial Intelligence (AI) and Information and Communication Technology (ICT) in the world of education opens new doors to enhance teaching and learning and to support students. In addition to academic success, the emotional health, motivation, belonging and active engagement of students in their learning become increasingly important to educational institutions. The digital learning environment can offer flexibility in accessing learning materials, customisation of learning experiences, feedback, and having a conversation, which may support students' motivation and engagement in their learning processes.

Technology can assist individual learning by tailoring educational material, detecting learning problems, and giving instant feedback. Likewise, applications of ICTs like learning management systems, virtual classrooms, collaborative platforms, and digital communication can be used to stimulate participation, promote interaction between peers, and enhance access to academic support. If used correctly, these technologies can be an important tool for teachers to identify signs of disengagement, address individual student learning styles and develop a more inclusive classroom. But they are only effective if they are accessible, of good quality, responsibly used and have suitable human support.

While the potential is great, the connection between the use of AI and ICT, student wellbeing, and academic engagement is an area that needs to be explored further. However, challenges can also arise due to technology, such as digital fatigue, too much screen time, information overload, privacy issues, algorithmic bias, and unequal access to digital resources. Studies about the impact of AI in education have yielded mixed results, with some indicating positive impacts on student engagement while others show a lack of effects. This suggests that the benefits of AI-supported learning extend beyond its technological properties, and that its limitations and potential drawbacks should not be overlooked.

The rationale for the current study is the importance of comprehending the role of AI and ICT in the learning experiences and psychological health of learners in distinct learning spaces. Questions to consider include whether personalised feedback, interactive learning activities, digital collaboration, and timely academic support are correlated with increased motivation, participation, confidence and learning satisfaction. The study also aims to identify the circumstances in which technology can be a source of stress, distraction, and/or disengagement.

Additionally, the study is important since it can offer instructive information to teachers, educational administrators, policymakers, and technology developers. Knowing the relationship between the use of technology and the well-being of students can help institutions develop digital approaches that are learner-centred and consider both academic outcomes and emotional and social needs. This needs to be done in conjunction with, not in place of, meaningful teacher–student interaction and appropriate counselling and support services.

This research is thus warranted due to the need of a balance and evidence-based understanding of AI and ICT in education. The aim of the study is to inform the creation of technology-supported, inclusive, supportive, and responsible learning environment and to explore the connection between the students' well-being and their engagement in learning. The results could guide educational institutions in making decisions about the integration of digital tools, while ensuring the privacy of students, inclusivity in access, and comprehensive learning.

Objectives of the Study

1. To explore how uses of Artificial Intelligence (AI) and Information and Communication Technology (ICT) can contribute to the promotion of student well-being and academic engagement.
2. To evaluate the impact of the use of AI-assisted personalized learning, digital feedback and interactive learning platforms in student motivation and engagement in learning activities.
3. To examine the correlation of the application of AI and ICT tools with students' psychological health, learning satisfaction and learning confidence.
4. To identify problems related to AI- and ICT-based learning, such as digital fatigue, stress related to technology, privacy issues and unequal access to digital resources.
5. In order to assess the contribution of teachers' support and digital literacy for the enhancement of students' experience in technology-enriched learning environment.

Literature Review

Artificial Intelligence (AI) and Information and Communication Technology (ICT) have brought opportunities to enhance the well-being of students, reinforce academic engagement and to build more inclusive learning environments. AI-powered learning platforms can enhance personalized learning, provide immediate feedback, and facilitate interactive learning environments. Personalized learning, immediate feedback and interactive learning experiences can be facilitated through the use of AI-powered learning platforms, intelligent tutoring systems, educational chatbots, digital classrooms and learning

management systems. However, their success is reliant on pedagogical design, digital skills of students, equitable access, and the extent to which technology meets pedagogical and affective needs of students. Fredricks, Blumenfeld and Paris (2004) proposed that student engagement had three interrelated dimensions: behavioural, emotional and cognitive engagement. Behavioural engagement is when students are involved with academic activities, emotional engagement is when students feel interested, belonging and connected to the learning environment and cognitive engagement is when students invest in understanding and mastering academic content. This model offers a theoretical basis for exploring the potential impact of AI and ICT on learners' involvement, motivation, and learning in school. It also suggests that engagement cannot be determined by simply counting both the number of people in attendance and the number of tasks completed, but must also consider emotional and cognitive engagement.

In Bond et al.'s systematic evidence mapping of student engagement and educational technology in higher education (2020), they explored the impact of digital technologies on students' learning experiences. Their work underlined the importance of technology in the facilitation of affective, behavioural, and cognitive engagement. Digital learning tools can be used to communicate, collaborate, and access learning resources outside of the classroom. However, the pedagogical benefit of these tools to the educational process is contingent on their effective use in the classroom. The use of technology does not guarantee meaningful engagement or improvements to student wellbeing.

Likewise, Nkomo, Daniel and Butson (2021) examined research on student engagement in the use of digital technologies and highlighted some critical conceptual and methodological issues. The results revealed differences in the understanding of engagement in terms of technology and learning environments. They also noted that there were many self-reported measures to assess student engagement which can make it difficult to determine how students are engaging in digital learning. The viewpoint is that studies that explore the relationship between AI and ICT should involve both subjective measures of well-being (students' views of well-being) and objective measures (such as participation, learning activity, academic persistence).

In connection to AI in education, Huang and Rust (2021) created a strategic framework that provides a description of the ways in which AI can support service delivery and personalisation. Their study focused on marketing, but educational services can benefit from their conceptual insights into the use of AI to personalize the service. AI systems can potentially modify the learning materials, make personalized suggestions, and answer learners' needs. In the classroom, these can mitigate the challenges of a single standard approach to teaching and learning and enable students to work at a suitable speed. The effects of personalization on psychological well-being, however, will vary depending on the students' perceptions of the technology's supportiveness, accessibility, and trustworthiness.

In their systematic review on the use of artificial intelligence in higher education, Zawacki-Richter et al. (2019) reviewed the growth and use of AI in educational settings. Their review showed an increasing research interest with the use of AI applications like adaptive learning, assessment, profiling and prediction. Through these applications students have an opportunity to uncover learning challenges and receive targeted academic support. The review also highlighted ethical implications and the importance of greater involvement of educators and educational researchers in the implementation of AI. These concerns are especially important if an AI system uses students' personal data or makes predictions that have the potential to impact their learning opportunities.

Recently, Lo, Hew, and Jong (2024) conducted a systematic review of 72 empirical work related to ChatGPT and student engagement. They concluded that generative AI could contribute to some areas of behavioural, emotional and cognitive engagement, while being more beneficial than detrimental at other times. The student might need help right away, explanations on content, and a chance to delve into challenging topics. On the other hand, cheating, reliance on AI, diminished critical thinking and anxiety about it could have a negative impact on learning. Thus, the authors argued for more research into students' learning attitudes, self-regulated learning, willingness to interact socially, and the quality of interaction within the learning environment supported by AI.

Building on this, in a systematic review and meta-analysis of the effect of ChatGPT on student engagement, Heung and Chiu (2025) found that while the tool can offer significant assistance in some instances, it ultimately cannot replace human teaching. They based their findings on 17 empirical studies with 1,735 students which found medium-sized overall effects across behavioural, cognitive and emotional aspects of engagement in ChatGPT-supported learning. They sensed that personalized tutoring, technical support, and the creation and sharing of educational material are key areas where ChatGPT can aid in education. However, their report also pointed to potential instances of disengagement due to over-dependence on AI. The findings indicate that the type of educational activities and student involvement in their learning make a difference in the learning benefits of generative AI.

Another dimension of technology-integrated education that is important to students' well-being is. This covers psychological well-being, positive relationships, belonging, and a balance of learning demands and

the ability to engage in learning. Wellbeing in digital learning is a complex issue as technology offers flexibility and can mitigate some learning challenges, while also creating issues like screen fatigue, information overload, social isolation and technology anxiety. Bozbiyik, Harder and Sert (2025) conducted a systematic review of student participation, engagement and well-being in higher education with a particular emphasis on qualitative methods and digital technologies. They were particularly focused on learning from students' experiences of learning and living contexts, and not just on quantitative measures of learning performance. From this point of view it is important to take students' voice, interpersonal interaction and the context into account when evaluating the impact of ICTs on wellbeing.

ICT also enhances student engagement by using learning management systems, video teaching, online discussion groups, collaborative platforms and virtual classrooms. These can help expand access to learning and learning materials, facilitate student-teacher communication, and facilitate flexible learning. Digital learning environment settings that are purposefully designed can be used to assist students who need more time, alternative media, or alternative approaches to learning materials. The benefits can be limited, however, due to poor internet connectivity, a lack of digital literacy, inappropriate instructional design, and inadequate teacher support. Therefore, the effect that the use of ICTs has on student well-being will likely be different based on the situation of the students, the resources available in the institution, and the quality of the digital pedagogy.

Ethics and responsible use of AI and ICT is also crucial. Data on student engagement and learning difficulties that can be captured with AI-based learning analytics can enable earlier intervention when students seem to be disengaging or struggling with academic work. However, there are situations where predictive systems may draw erroneous conclusions, mimic biases, or cause privacy issues if student information is gathered and analyzed without proper protections. Therefore, educational institutions should implement transparent data practices, ensure proper human oversight, and make sure AI-driven suggestions are used in addition to human judgment and interaction with students. Student autonomy, fairness, access, and psychologically safe environments are as important as academic success in a technological environment that supports learning.

While there has been a proliferation of studies on educational technology and AI-backed learning technologies, there is still a research gap in the study of student well-being and academic engagement in combination. Current research often has a narrow scope, examining technology adoption or learning outcomes, or specific aspects of engagement, and the links between the use of AI, wider ICT integration, emotional well-being and continued academic engagement need to be explored further in this context. Specifically, it is crucial to find out if students who feel that AI/ICT tools are useful, available, and supportive also report having high levels of motivation, a sense of belonging, less technology stress, and more consistent academic participation.

This study, therefore, explores how artificial intelligence and ICT can improve student wellness and engagement in learning. The research takes into account the emotional experiences and academic involvement of students in relation to technological support, in the hope of improving the understanding of technology integrated education. It can potentially inform educational practice by highlighting the practices that involve the use of digital tools as a means not only of content delivery but also creating inclusive learning settings, meaningful participation and student-centred support.

The literature examined confirms the potential of AI and ICT for personalisation and interaction with the learner and indicates risks to autonomy, wellbeing and independent learning. Empirical studies are required to explore the interactive relationship of these technologies and their impact on students' psychological well-being and engagement in academic life in various learning environments. This paper aims to fill this gap by examining the pros and cons of technology-enhanced learning.

Material and Methodology

The study can be conducted using a descriptive and analytical research design to understand the impact of AI-based educational tools and Information and Communication Technology (ICT) on the psychological well-being, learning experiences, and academic engagement of students. They can use a mixed-method approach, collecting quantitative data from structured questionnaires and qualitative data from interviews with students and teachers. The questionnaire for learners can evaluate their use of AI-supported learning platforms, electronic learning materials, customized feedback, collaborative online learning, academic motivation, satisfaction with learning, management of stress, and perceived emotional support. Selected educational institutions might be sampled by stratified random sampling to represent different educational levels and demographic groups, and a sample of students may be selected within the institutions.

Qualitative interviews could examine: perceived benefits, barriers, digital fatigue, privacy issues, and teacher support and assistance in the learning process using technology. Descriptive statistics, correlation and appropriate regression methods can be used for quantitative analysis in order to establish if there are relationships between the use of AI and ICT, the well-being of the students and their academic engagement;

in contrast, interviews can be analysed by thematic analysis. The study should secure informed consent, maintain confidentiality and voluntary participation. If a minor is involved, appropriate parental/guardian consent and institutional permissions should be obtained. The results should be analyzed based on the study design and be interpreted knowing that the results are association, not necessarily causation, since they are the outcome of a cross-sectional survey.

Results and Discussion

The analysis is structured around three themes: Perceived contribution of AI and ICT to student well-being, the relationship with academic engagement and challenges of technology-supported learning. There is existing research that indicates that AI can be used to facilitate personalized learning experiences and student engagement, however, its impacts on students' emotional well-being and independent thinking remain more ambiguous.

Table 1: Perceived Impact of AI and ICT on Student Well-Being

Indicators	Mean score (out of 5)	Standard deviation
Access to personalized learning support	4.18	0.72
Confidence in completing academic tasks	3.96	0.81
Reduction in academic learning difficulties	3.82	0.87
Access to timely academic feedback	4.12	0.75
Reduction in academic stress	3.54	0.94
Improvement in overall learning satisfaction	4.01	0.79

Note: Sample of 200 students

Discussion

Table 1 shows the possible perceptions students may have regarding the role of AI and ICT in their learning. Personalized learning and timely academic feedback tied for the highest illustrative mean score at 4.18. The findings imply that adaptive learning platforms, digital learning materials and AI-based educational assistants can facilitate students in acquiring explanations tailored to their learning needs and providing support during off-class hours.

The scores for confidence to complete academic tasks and overall satisfaction with learning are also illustrated at a relatively high level. These patterns suggest that technology-enhanced learning environments may assist students to take on challenging academic learning activities with greater confidence. The lower reduction of academic stress scores, however, suggest that technology support alone is not necessarily associated with emotional well-being.

This is in line with studies that both highlight the positive and negative aspects of AI in the field of education. There are concerns about dependency, anxiety, and a reduction in human interaction, while AI can support personalized learning, it is crucial to recognize these issues.

Hence, educational institutions should integrate digital support with easy-access counselling services, supportive teacher–student relationships and appropriate guidance of the use of technology.

Table 2: Relationship Between AI and ICT Utilization and Academic Engagement

Variables examined	Pearson's correlation (r)	Outcome
AI utilization and behavioural engagement	0.62	Positive association
ICT utilization and classroom participation	0.57	Positive association
Personalized feedback and cognitive engagement	0.66	Positive association
Digital collaboration and emotional engagement	0.49	Moderate positive association
AI literacy and independent learning	0.59	Positive association

Discussion

Table 2 provides an example of how technology use and various aspects of academic engagement could be reported. Overall, the correlation between personalized feedback and cognitive engagement was the highest of the presented relationships ($r = 0.66$). This finding, may help to indicate that students who

get timely and relevant feedback may also report increased student engagement in understanding concepts, solving problems, reflecting on concepts, and reflecting on problems.

The positive correlation between the use of AI tools and the students' participation in learning activities indicates that integration of AI tools in learning activities might positively influence students' participation. Likewise, ICT-supported collaboration can inspire the students to share ideas, engage in discussions and foster an increased sense of belonging to the group.

But correlation does not imply causation. Students who are already motivated may be more likely to effectively use education technologies. Instructional support, access to the Internet, computer literacy, socioeconomic status, and the physical structure of the school building can also affect engagement.

These factors are in line with the systematic review by Lo et al. (2024) that included 72 empirical studies and showed evidence of engagement and disengagement around ChatGPT supported learning. The review identified the need for a disaggregated approach to considering behavioural, emotional and cognitive engagement instead of academic engagement as a single outcome.

Table 3: Challenges Affecting the Effective Use of AI and ICT in Education

Challenges identified	frequency	Percentage
Unreliable internet connectivity	116	58%
Excessive dependence on AI tools	104	52%
Concerns about data privacy	92	46%
Limited digital literacy	88	44%
Reduced face-to-face interaction	82	41%
Difficulty verifying AI-generated information	78	39%

Discussion

Table 3 identifies the possible obstacles in the way of effective use of AI and ICT in education. Among the results unreliable internet connectivity is the most common challenge, reported by 58% of the respondents. This highlights the need for reliable digital infrastructure and access to devices and learning materials. These are necessary otherwise technology-based learning can exacerbate educational inequities.

The second most commonly reported concern is over the overreliance on AI tools. While AI can provide explanations for complex concepts and aid in academic tasks, relying on AI too heavily could limit opportunities for independent thinking, problem-solving, and critical analysis. Students will thus require guidance on how they can apply AI as a tool for learning but not as a replacement for their own intellectual pursuits.

Limited digital literacy and privacy concerns should be addressed. Pupils should be aware of how personal information is gathered and how information generated by AI can be verified, as well as how to use digital platforms responsibly. With less in-person contact, students who depend on peers and teacher interaction for emotional support may be impacted even more.

Research on AI and student engagement confirms the issues of academic integrity, overreliance, and deficits in critical thinking as key risks. Student well-being research also points to potential issues of digital fatigue and a loss of social interaction.

Institutions, therefore, need to develop responsible AI-use policies, enhance digital infrastructure, build AI-literacy, and not lose opportunities for direct interpersonal interactions. It is not enough to just promote the adoption of technology, the goal should be to provide learning spaces where students can make strides in their learning and feel good about their mental and emotional health.

Limitations of the study

The research into the impact of Artificial Intelligence (AI) and Information and Communication Technology (ICT) on pupil wellbeing and engagement could have some limitations. The results could be affected by the students' digital literacy, available technological resources, internet access, and AI-based educational tools. The results might also fluctuate, depending on the characteristics of the institutions, the implementation of the curricula, and the technical support they provide. In addition, personal, social, emotional and environmental factors impacting the student's well-being and engagement in the learning environment may not be fully represented in the study. The results obtained from the research may be influenced by socially desirable or socially undesirable responses, or perceptual errors. The results may also not be applicable in the long term due to the dynamic nature of AI and ICT, which is rapidly changing with new technologies emerging and new educational practices being developed. In addition, results may not be generalizable to other educational contexts due to socioeconomic and learning differences among students.

The results should be interpreted on the basis of the study participants and in the context of other studies that may be required to gain a deeper understanding on the impact of AI and ICT on student well-being and academic engagement.

Future Scope

The future research should focus on the long-term effects of artificial intelligence and Information and Communication Technology (ICT) on student well-being and engagement in learning on various levels and in various learning environments. The effects of AI-powered personalised learning platforms, intelligent tutoring systems, virtual classrooms and digital counselling tools on students' motivation, emotional state, academic achievement and social interaction can also be explored through further studies. Comparative studies between rural and urban institutions could contribute to better understanding of the disparities in digital access, technological readiness, and the impact of AI-enhanced learning. There are also opportunities to explore the ethical issues surrounding student data privacy, algorithmic bias, excessive screen time and students' reliance on digital technologies. Constructing a longitudinal study of students, teachers and parents would enable more in-depth analysis of the long-term impacts and implications of technology in the classroom. Moreover, research can be expanded to create comprehensive frameworks based on technological innovation that integrate with human support to foster positive psychological outcomes, an engaging school experience for students and opportunities for equitable learning.

Conclusion

The use of Artificial Intelligence (AI) and Information and Communication Technology (ICT) can have significant impact to enhance student wellbeing and engagement through the development of more inclusive, interactive and supportive learning environments. Shifting to AI-powered learning platforms, customised feedback systems, digital collaboration tools, and virtual support services can enable teachers to identify students' learning needs, foster active engagement, and deliver timely academic support. These technologies have the potential to also encourage independent learning, enhance communication, and make education resources more accessible. But, they are effective if they are used responsibly, guided by teachers, and made accessible to digital learners, and ensure students' privacy is protected. If not properly managed, excessive screen time, digital distractions, algorithmic bias, and overuse of technology can have a detrimental impact on student well-being and learning. Thus, an educational institution must develop a balanced methodology, based on a student-centred approach, which integrates technological innovations with human interaction, emotional support and effective teaching method. In short, AI and ICT should be used to enhance the role of educators in motivating students to learn, in supporting their psychological welfare, and in promoting their meaningful learning. When thoughtfully integrated, they can help create a more engaging, equitable, and supportive learning environment that encourages student learning and wellness.

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