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Leveraging on AI Tools in Hybrid Learning for Inclusive Learning Analytics: Evidence from a South African Disadvantaged University

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Abstract:

Background: The rapid integration of Artificial Intelligence (AI) into higher education has transformed hybrid learning environments by enabling personalised, data-driven, and inclusive teaching and learning practices. AI-powered learning analytics offer opportunities to monitor student engagement, predict learning outcomes, and provide timely interventions, thereby addressing the diverse needs of students in increasingly complex educational settings. Despite these advancements, there is limited understanding of how AI-enabled learning analytics can effectively promote inclusivity and equitable learning experiences within hybrid learning environments.

Purposes: This study explores the utilisation of AI tools in hybrid learning environments to advance inclusive learning analytics. Specifically, it examines how AI-enabled technologies support personalised learning, enhance student engagement, improve academic performance, and facilitate informed pedagogical decision-making in higher education.

Method: A qualitative research approach was adopted to gain in-depth insights into participants' experiences and perceptions of AI-supported learning analytics. Data were collected from participants across two university campuses through semi-structured interviews and analysed using thematic analysis. The study was informed by the theoretical foundations of learning analytics, inclusive education, and educational data science.

Results: The findings revealed two dominant themes: personalised learning and academic performance enhancement. Participants reported that AI-powered tools, including adaptive learning platforms, predictive analytics, automated feedback systems, and intelligent dashboards, enabled tailored learning experiences, continuous feedback, and early identification of at-risk students. These capabilities improved learner engagement, supported academic success, and empowered educators to implement targeted interventions. The findings further demonstrated that AI-driven learning analytics can foster greater inclusivity by accommodating students with diverse socio-economic, educational, and technological backgrounds, thereby promoting equitable access to learning opportunities.

Conclusion: The significance of this research lies in its contribution to the growing body of knowledge on AI-enhanced learning analytics and its potential to move beyond traditional student performance monitoring towards more equitable, student-centred educational practices. The study also responds to the increasing demand for flexible and inclusive learning models in higher education, particularly within contexts characterised by large class sizes, diverse student populations, and limited resources.

Keywords: Artificial Intelligence, Blended Learning Environment, Decision-Making, Data Literacy, and Learning Analytics.

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Introduction

The rapid advancement of Artificial Intelligence (AI) has significantly reshaped teaching, learning, and assessment practices in higher education, particularly within hybrid learning environments that combine face-to-face and online modalities (Huang et al, 2022). Hybrid learning has become increasingly prominent as institutions seek flexible, scalable, and resilient instructional models capable of addressing diverse student needs and changing educational contexts. However, the complexity of hybrid learning environments generates large volumes of learner data that are often underutilised for pedagogical decision-making and student support. In this context, AI-powered learning analytics offer powerful mechanisms for transforming raw educational data into actionable insights that support inclusive and student-centred learning practices (Siemens & Baker, 2012; Viberg et al., 2018).

Artificial Intelligence tools including machine learning algorithms, predictive analytics, adaptive learning systems, and intelligent dashboards enable the continuous monitoring of student engagement, performance, and learning behaviours across hybrid learning platforms. These tools support early identification of at-risk students, personalised feedback, and adaptive learning pathways, thereby enhancing both teaching effectiveness and student success (Zawacki-Richter et al., 2019). Importantly, AI-driven learning analytics extends beyond performance measurement by offering opportunities to promote inclusivity through personalised support, accessible learning resources, and data-informed interventions that respond to learner diversity (Holmes et al, 2019).

In contexts such as South African higher education where institutions face persistent challenges related to student preparedness, socio-economic inequality, and digital access AI-enabled inclusive learning analytics hold particular relevance (Khalifa & Albadawy 2024). By supporting evidence-based student support strategies and equitable learning design, AI tools can contribute to national priorities of access, success, and transformation in higher education. Consequently, leveraging AI tools within hybrid learning environments represents a critical pathway for advancing inclusive, responsive, and sustainable learning analytics practices in contemporary higher education (Gohr et al, 2025).

While AI-driven learning analytics tools have the potential to support early identification of at-risk students, personalised feedback, and adaptive learning pathways, their application in hybrid learning contexts remains uneven and underdeveloped, particularly in institutions serving diverse and underprepared student populations. In the South African higher education context, persistent challenges such as socio-economic inequality, uneven digital access, large class sizes, and varying levels of academic preparedness limit the effective use of learning analytics for inclusive student support (Bozkurt et al, 2021). As a result, learning analytics practices often remain descriptive and reactive rather than inclusive, predictive, and intervention-oriented (Zawacki-Richter et al., 2019). This gap highlights the need to explore how AI tools can be systematically leveraged to enhance inclusive learning analytics within hybrid learning environments.

Literature Review

In explaining the impact of AI tools on hybrid learning, it is essential to note that a study conducted by Kelly et al. (2023) argues that introducing artificial intelligence has a positive but insignificant effect on data security privacy. This shows that although several studies argue that using AI tools positively influences the education sector, its effect might be insignificant to data security privacy. Conversely, (Castro 2019) revealed that AI can enhance and facilitate learning in one-on-one, virtual, and blended learning environments. Further, the above researchers also posited that there is a need for teacher training and further research to understand the possibilities of AI in educational assessment, specifically in higher education. After employing systematic reviews to examine AI education's potential benefits and risks, Baidoo-Anu and Ansah (2023) argued that AI tools such as ChatGPT have strengths and benefits since they answer and generate information that is highly relevant to the information requested. ChatGPT provides various educational opportunities, such as educational materials that can support complex learning. Other studies, such as Vázquez-Parra et al. (2024), also argue that the Effective adoption of AI depends on the perception and acceptance by university students.

According to (Pearson 2024), A growing body of work emphasises the potential of AI-enhanced learning analytics to promote inclusivity by accommodating learner diversity. For example, the integration of AI with Learning Management Systems (LMSs) such as Moodle and Blackboard can personalise support for students with varied learning needs, offering adaptive content, automated feedback, and real-time monitoring that can help identify and support at-risk learners (Alotaibi, 2024). This aligns with findings that AI-enabled conversational agents, predictive analytics, and adaptive assessments can enhance engagement and outcomes, especially in blended or hybrid learning contexts where student access and readiness may be uneven.

Involving both students and instructors in the co-design of AI-powered learning analytics systems has also been identified as a promising practice for balancing pedagogical goals with ethical considerations. Recent research highlights tensions between privacy and utility, and between automated insights and teacher guidance, underscoring the need for participatory design approaches that respect stakeholder expectations while leveraging AI capabilities for inclusive analytics (Alfredo et al, 2025). Despite the growing promise of AI in learning analytics, challenges related to ethical use, data privacy, digital equity, and faculty preparedness persist. Scholars call for frameworks that prioritise transparency, ethical governance, and contextual deployment of AI tools to ensure that analytics practices do not inadvertently reinforce existing inequities, especially in resource-constrained environments (Rodríguez-Ortiz et al, 2025). The premises of this study is to explore the role of AI-driven analytics in enhancing student engagement, monitoring learning progress, and informing pedagogical decision-making in blended and hybrid learning

environment. In achieving this, the research question for this study is to what extent AI tools are used for inclusive learning analytics. Learning analytics (LA) has emerged as a key field in educational technology, offering data-driven insights into student behaviour, engagement, and performance. Its importance has grown in hybrid learning environments where face to face and online modalities intersect as institutions seek to personalise learning, support diverse learners, and improve outcomes. Learning analytics systems collect and analyse large volumes of educational data, enabling educators to move beyond generalised feedback toward more targeted, individualised instructional interventions that can enhance equity and inclusion (Sharif & Atif, 2024).

AI in South African Higher Education

In the South African higher education context, Artificial Intelligence (AI) has growing relevance for advancing inclusive learning analytics, particularly in institutions characterised by diverse student populations, large class sizes, and persistent socio-economic inequalities. AI-driven learning analytics enables universities to analyse patterns of student engagement, access, and performance across hybrid and online learning environments, thereby supporting early identification of academically at-risk students and targeted interventions (Siemens & Baker, 2012; Viberg et al., 2018). This is especially critical in South Africa, where disparities in digital access, preparedness, and learning support continue to affect student success. AI-supported analytics can facilitate personalised learning pathways, adaptive feedback, and accessible learning resources that respond to varied learning needs and contexts, contributing to more equitable learning experiences (Holmes et al, 2019). Furthermore, AI-enabled inclusive analytics provide institutional leaders with evidence-based insights to inform student support strategies, curriculum redesign, and retention initiatives aligned with national priorities for transformation, access, and success in higher education (Zawacki-Richter et al., 2019). When implemented ethically and with sensitivity to local infrastructural constraints, AI in learning analytics offers a promising mechanism for promoting inclusion and improving student outcomes in South African universities.

Importance of AI tools for Hybrid Learning

Artificial Intelligence (AI) tools play a critical role in enhancing hybrid learning by enabling more personalised, adaptive, and data-informed educational experiences. In hybrid learning environments where face-to-face and online modalities intersect AI supports adaptive learning systems, automated feedback, predictive analytics, and intelligent tutoring, which collectively help address diverse learner needs and learning paces. AI-driven learning analytics allow educators to monitor student engagement and performance in real time, identify at-risk students early, and design timely interventions, thereby improving retention and academic success (Siemens & Baker, 2012; Viberg, Hatakka, Bälter, & Mavroudi, 2018). Furthermore, AI tools contribute to inclusive education by supporting accessibility features such as automated captioning, personalised content recommendations, and flexible assessment pathways, which are particularly valuable for students from varied socio-economic and academic backgrounds (Holmes et al, 2019). In the context of hybrid learning, AI enhances instructional efficiency and pedagogical decision-making while supporting scalable and sustainable teaching practices in higher education institutions (Zawacki-Richter et al., 2019). In addition, AI-driven analytics enables early identification of at-risk learners by monitoring engagement patterns and assessment data, allowing educators to provide timely and targeted support that is essential for student success in blended contexts (Mulenga & Shilongo 2025). Beyond personalization, AI tools such as automated grading, intelligent tutoring systems, and interactive feedback generators reduce administrative burdens on instructors, freeing up time for more meaningful pedagogical interactions and reflective practice. Importantly, AI can also support inclusivity by making learning materials more accessible and responsive to diverse student populations, including those with varied cultural and educational backgrounds Lin et al, 2024). As blended and hybrid models become more prevalent in post-COVID-19 education, the strategic use of AI tools holds promise for improving learner outcomes, fostering engagement, and supporting responsive, equitable learning environments.

AI in Inclusive Analytics Learning

Artificial Intelligence (AI) plays a pivotal role in advancing inclusive learning analytics by enabling data-driven approaches that recognise and respond to learner diversity within digital and hybrid learning environments. AI-powered learning analytics leverage machine learning algorithms, predictive modelling, and adaptive systems to analyse student engagement, performance, and behavioural patterns, allowing educators to identify at-risk learners and provide timely, personalised interventions (Mbangeleli, & Funda, 2024, November). Importantly, AI supports inclusivity by facilitating personalised learning pathways, accessible feedback mechanisms, and adaptive content delivery that accommodate students with varied academic abilities, learning preferences, and socio-economic backgrounds (Holmes et al, 2019). Furthermore, AI-driven inclusive analytics can help mitigate educational

inequalities by informing institutional decision-making, enhancing early-warning systems, and supporting equitable student support strategies (Zawacki-Richter et al., 2019). When implemented ethically and transparently, AI-enabled learning analytics contribute to more equitable, responsive, and student-centred educational practices in higher education. The integration of Artificial Intelligence (AI) with learning analytics represents a significant evolution in this field, extending analytical capabilities from descriptive statistics to predictive modelling, adaptive learning pathways, and real-time pedagogical insights. Research shows that AI-powered learning analytics dashboards and systems are increasingly used to predict academic performance, detect disengagement, and support self-regulated learning (Cabral et al, 2025). These tools utilise machine learning methods, ensemble algorithms, and Bayesian models to provide dynamic feedback that complement traditional assessment approaches, contributing to more responsive and inclusive learning environments.

Learning analytics (LA) the measurement, collection, analysis, and reporting of data about learners and their contexts has become a central mechanism for enhancing teaching and learning in hybrid educational environments (where online and face-to-face instruction converge). In hybrid learning settings, LA helps capture complex learner behaviours across multiple interaction points (e.g., discussion forums, assessments, and LMS activity logs), enabling educators to make evidence-based pedagogical decisions and design more responsive learning experiences. Recent research suggests that innovative AI-enhanced LA tools offer deeper insights into student engagement, performance trajectories, and learning challenges than traditional analytics models, especially where large data volumes are involved (Maqoqa, 2025). Artificial Intelligence (AI) extends the analytical reach of learning analytics by introducing adaptive, predictive, and real-time data processing capabilities. For example, AI-powered sentiment analysis, topic mapping, and cognitive progression tracking provide more holistic insights into how learners interact with content, participate in collaborative tasks, and experience cognitive load during learning activities. Integrating AI-driven analytics with LMS platforms (e.g., Moodle, Blackboard) enables educators to track both active and passive participation, generate real-time alerts, and tailor instructional strategies to learner needs, thereby contributing to improved student outcomes and increased engagement (Sajja et al., 2025). A growing body of work also highlights the importance of human-AI hybrid intelligence in learning analytics, where AI complements human interpretation rather than replaces it. Hybrid intelligence frameworks emphasise the co-operation between AI systems and educators, supporting richer analysis of learning processes and fostering reflective practice (Cukurova, 2024, Jing et al, 2023). In hybrid learning contexts, this synergy is crucial for making LA insights pedagogically meaningful and aligned with curriculum expectations. Inclusive learning analytics focuses on equity and diversity, ensuring that LA practices benefit all learners, including those from historically marginalised or under-supported backgrounds. Systematic reviews of LA research show that while LA has the potential to promote inclusiveness (e.g., by identifying disengagement among students with disabilities), empirical work in this area remains limited (Khalil et al., 2024). AI-enhanced LA tools have the potential to fill this gap by detecting subtle patterns in engagement and performance that traditional metrics might miss, thus supporting personalised and differentiated learning pathways.

Educational Data Science

Educational Data Science (EDS) has rapidly emerged as a foundational discipline underpinning the effective use of data to improve teaching, learning, and educational outcomes. Defined as the interdisciplinary field that applies statistical analysis, machine learning, data mining, and domain expertise to interpret complex educational datasets, EDS enables stakeholders to extract actionable insights from the vast amounts of data generated in hybrid learning environments (Papamitsiou & Economides, 2014). As hybrid models become standard in higher education, especially post-COVID-19 educational institutions increasingly rely on sophisticated data analysis to assess student engagement, personalise learning pathways, and support equitable student success. At the heart of EDS is the integration of Artificial Intelligence (AI) into the analytics pipeline, transforming raw educational data into interpretive frameworks that inform pedagogical decision-making. AI techniques such as deep learning, natural language processing, and predictive modeling have been widely adopted to process and contextualise data captured from Learning Management Systems (LMSs), intelligent tutoring systems, and interaction logs (Nguyen et al, 2021 and Baker & Inventado, 2014). For example, predictive analytics models can identify patterns of disengagement or risk early in the semester, enabling educators to intervene with targeted support interventions (Siemens & Long, 2011). These predictive insights are particularly important in hybrid settings, where student behaviour is distributed across digital and face to face spaces. Recent studies demonstrate that AI-enhanced EDS enables adaptive learning analytics, which can tailor content delivery to individual learner profiles (Funda & Mbangeleli, 2024). Adaptive analytics leverage real-time data to dynamically adjust learning pathways, allowing students from diverse backgrounds such as those with varying levels of academic preparedness, access to digital resources, or learning preferences to engage with content in personalised ways (Zawacki-Richter et al., 2019). Such systems are especially

valuable in inclusive analytics frameworks that aim to reduce educational inequities and promote student success across heterogenous learner populations. Moreover, EDS has broadened the analytical lens beyond individual performance to support institutional analytics and policy planning. Aggregate data analyses help institutions understand macro-level trends, resource gaps, and programme effectiveness. This aligns with strategic educational goals, such as improving retention, supporting underrepresented groups, and informing curriculum redesign efforts objectives that are central to inclusive learning initiatives (Buckingham Shum & Deakin Crick, 2016). Despite the potential, challenges persist. Ethical concerns around data privacy, algorithmic bias, and transparency remain central in EDS research. Scholars emphasise the need for governance frameworks that ensure responsible use of AI and protect student rights while maximising the educational value of data (Williamson & Eynon, 2020). Furthermore, disparities in technological infrastructure and data literacy among educators can limit the full implementation of sophisticated EDS interventions, highlighting the need for capacity development and contextualised solutions.

The study aims to explore how AI-enabled learning analytics can enhance student engagement, track learning progress, and support informed pedagogical decision-making within blended and hybrid learning contexts. To achieve this, the study focuses on the following objectives will be met

1. To explore the extent to which AI tools are used for inclusive personalised learning analytics
2. To assess the potential of AI-enabled learning analytics to promote academic performance enhancement

Research Method

This study adopted a qualitative research approach to explore students' experiences and perceptions of leveraging Artificial Intelligence (AI) tools in hybrid learning for inclusive learning analytics. A qualitative design was considered appropriate as it allows for an in-depth understanding of participants lived experiences, meanings, and interpretations of AI-supported learning practices within hybrid learning environments. The study was conducted across two campuses, from University of Fort Hare as one of disadvantaged institution in Eastern cape. The two campuses were selected to capture variation in learning contexts, technological access, and student experiences within the same institutional system. The multi-campus approach enabled comparative insights into how AI tools and learning analytics are experienced in different hybrid learning settings, thereby strengthening the credibility of the findings. Participants consisted of eight undergraduate students drawn from hybrid learning programmes from each campus and making sixteen undergraduate students across the two campuses. A purposive sampling technique was employed to select students who had prior exposure to hybrid learning platforms and AI-supported tools such as learning analytics dashboards, automated feedback systems, or adaptive learning features within the Learning Management System. The sample size was considered appropriate for a focus group study, allowing for rich interaction while ensuring manageability of discussion.

Data were collected using focus group discussions, which provided an interactive platform for participants to share experiences, compare perspectives, and reflect collectively on the role of AI tools in supporting inclusive learning analytics. The focus group sessions were guided by a semi-structured interview protocol covering themes such as accessibility, personalisation, engagement, feedback, early academic support, and inclusivity in hybrid learning. Each focus group session was audio-recorded with participants' consent and lasted approximately 60–90 minutes.

The data were analysed using NVivo thematic analysis, following a systematic process of transcription, familiarisation, coding, theme development, and interpretation. An inductive approach was applied to allow themes to emerge directly from the data, with particular attention given to how AI tools influenced students' sense of inclusion, learning support, and engagement in hybrid learning environments.

The study received ethical clearance from the University of Fort Hare Research Ethics Committee (FUN003-24 (Project)). All participants provided informed consent prior to participation. Anonymity was maintained by ensuring that no identifying information was collected, and confidentiality was preserved by storing the data on a password-protected system accessible only to the research team.

Results

Demographic Information

The study presents a summary of participants distribution across two campuses and departments, showing a balanced and structured sampling approach. Firstly, the data indicates that a total of 16 participants were involved in the study,

with 8 participants from each campus, Alice and East London. This equal distribution suggests a deliberate effort to ensure comparative representation across locations, which strengthens the reliability of the findings and allows for meaningful cross-campus analysis. In terms of disciplinary representation, participants from Alice are drawn from Business Administration, while those from East London are from Information Systems. This reflects an interdisciplinary perspective, combining business-oriented and technology-focused insights, which is particularly valuable for studies related to curriculum development, digital tools, or AI integration. The use of coded identifiers (P1–P8 and P9–P16) ensures proper organisation of participants and maintains anonymity and ethical compliance in data handling. It also suggests a systematic data collection process, likely aligned with qualitative or mixed-method research. Overall, the table demonstrates a balanced, purposeful sampling strategy, with equal representation across campuses and clear categorisation by department. This enhances the credibility, diversity, and transferability of the study findings, while allowing for nuanced insights based on both geographical and academic contexts.

Table 1: Anonymous participants interviews

Participants	Use Code	Department	No of Participants
Alice	P1-P8	Business Adminstration	8
East London	P9-P16	Information System	8

Results Analysis

The results for this study generated two (2) themes on the Leveraging on AI Tools in Hybrid Learning for Inclusive Learning Analytics. The themes were identified based on the data collected, transcribed, and imported to NVivo for file classification, creation of code as the generated theme analyzing using NVivo. The themes generated are Personalised Learning and Academic Performance Enhancement under AI Learning Analytics.

AI Learning Analytics

Learning analytics is a dynamic field that focuses on the collection, measurement, analysis, and reporting of data related to learners and their contexts (Osakwe et al, 2022). It aims to enhance educational experience by providing insights that can inform teaching practices, improve student outcomes, and facilitate institutional decision-making. The responses gathered are in line with this submission as highlighted below for Theme 1: personalised learning and Theme 2: Academic performance enhancement

Theme 1: Personalised Learning

According to, Ifenthaler and Yau (2020) found that learning analytics and AI-driven interventions enable educators to identify students' strengths and weaknesses, thereby facilitating targeted academic support. Participants further noted that personalised recommendations and adaptive feedback mechanisms helped them learn at their own pace, improving confidence and academic participation as highlighted below:

<Files\\Alice> - § 9 references coded [18.69% Coverage]

Reference 1 - 3.08% Coverage

"AI has revolutionised education by personalising learning experiences, analysing individual styles, providing instant feedback, and democratising access to resources. This has created more effective and inclusive environments, improving educational outcomes P3". "Since the introduction of AI into educational settings, I have been noticing some improvements in personalised learning experiences, increased accessibility for diverse learners, heightened engagement levels among students, enhanced assessment methods, and valuable data-driven insights for educators P4". "I have seen a big difference; I now pass my assignment as AI guides me on how to do them and I take notes for my tests from AI. Yes, I can complete assignments quicker, which then helps me manage my time. And also, I am able to understand the material better by asking AI tools to summarise them and also help me break down questions I don't understand P5". "Yes, I have noticed some changes. With the help of AI, I have discovered new relevant information that is very useful in a certain topic. They also help by providing a simpler understanding of certain modules in our course. With the aid of AIs, I know and understand my schoolwork better and this has enhanced my learning experience and that is shown through my gradebook P8".

<Files\\East London> - § 9 references coded [17.52% Coverage]

"AI such as blackboard can provide tailored feedback based on a student's individual needs and learning style. This can help me understand my strengths and weaknesses more effectively and focus on areas where they need the most support P9". "YES, AI helps in the sense that it simplifies the work taught in class. It provides examples, you have an option to question as much as you need and there is always an answer provided no matter how deep or simple P12". "Yes, I've definitely benefited from using AI as a study companion. It's saved me a great deal of time. While I still write notes by hand, I no longer feel the need to rewrite them multiple times to retain information. AI has helped strengthen my foundational knowledge, which means I don't need to keep rewriting my notes endlessly. I usually write them once, highlight the important parts, and then input these into ChatGPT- whichever version I'm using for that particular subject. For more specialised, practical modules like databases or business systems analysis, I even upload diagrams into ChatGPT so it can explain them in greater detail. This process saves me time and allows me to focus on practising questions rather than constantly revisiting my notes. This approach works especially well for theory-heavy modules, although it's less effective for subjects like databases or economics, which involve more practical elements, such as working with graphs P13". "It's easier to understand schoolwork because some AI tools can easily generate summaries of the work. Sometimes the work is not difficult, but the study material just over complicates it, AI tools like ChatGPT will use everyday English to make the work easier and more understandable P15".

Theme 2: Academic Performance Enhancement

Similarly, Viberg, et al, (2018) argue that learning analytics enhances academic achievement by enabling data-driven decision-making and early identification of students requiring academic support. Participants further indicated that AI-assisted learning promoted greater engagement, motivation, and self-directed learning, which positively influenced their academic success.

<Files\\Alice> - § 9 references coded [14.69% Coverage]

"Yes, I have noticed changes in my learning outcomes since AI has been introduced. AI has made it easier for me to understand information; it summarises information in a simpler manner making it easier for me to understand. It gives feedback to questions quicker, decreasing the amount of time that I spend on finding information. Since AI is able to generate que cards for topics one is interested in or will be tested on, I have noticed that some of my marks have improved since this has been a very useful tool P1". "Yes, I've noticed positive changes in my learning outcomes since using AI tools. These tools have made my study sessions more efficient by providing instant access to explanations, summaries, and practice exercises. For example, with AI tools like ChatGPT, I can quickly clarify concepts I find difficult, which has reduced the time I spend searching for information. Tools like Paraphraser AI have also improved my writing, helping me refine my ideas and express them more clearly. Overall, AI has made my learning more personalised and flexible, allowing me to work at my own pace and improve understanding faster P2". "Yes, I've noticed positive changes in my learning outcomes since using AI tools. I can grasp difficult concepts more quickly because tools like ChatGPT provide clear explanations and examples. AI also helps me stay organised by offering study plans and reminders, which has improved my time management. Tools like Grammarly have enhanced my writing skills, leading to better grades in assignments. Overall, I'm learning more efficiently, gaining a deeper understanding of subjects, and feeling more confident in my academic work P7"."Yes, as I have mentioned the types of AI tools I have personally used, they have helped me to be productive and be able to meet deadlines while maintaining good marks in almost all my modules P6".

<Files\\East London> - § 9 references coded [17.52% Coverage]

Reference 1 - 1.49% Coverage

"Since I started using AI tools, my grades improved, and I now understand some modules way better, mostly important they help me finish my assessments on time and submit P11"."Yes, I have been able to recall certain topics during tests because I had used AI tools to study by different methods be it mnemonics or even singing P10". Since I started using Quillbot and Grammarly, I was able to write my essays in a efficient way that helped me understand my work better and be a better writer, that then has helped me the most in my assignments and it has boosted my assignments marks P14". "Since the introduction of AI, I've noticed improvements such as: Increased Retention Tools that adapt to learning speeds have helped me retain information better. Interactive AI tools have made learning more fun and engaging, fostering a deeper interest in subjects. Since using AI, I've noticed improvements in my learning. I understand topics faster because the AI gives clear explanations and instant feedback. It also helps me stay organised and focused, making studying more efficient and enjoyable P16".

Discussion

Learning Analytics

The study "Leveraging AI Tools in Hybrid Learning for Inclusive Learning Analytics" contributes to the growing discourse on the role of artificial intelligence in enhancing equity and data-driven decision-making in education. Existing literature highlights that AI-driven learning analytics can support personalised learning, early identification of at-risk students, and improved instructional design (Zawacki-Richter et al., 2019; Holmes et al., 2022). In hybrid learning environments, often facilitated through platforms such as Blackboard Learn, AI tools enable the collection and analysis of diverse learner data across both online and face-to-face contexts, thereby supporting more inclusive and adaptive learning experiences. However, despite these advancements, a significant gap remains in how AI tools are effectively leveraged to ensure inclusivity, particularly for students from disadvantaged or underprepared backgrounds. Many existing studies focus on performance optimisation and predictive analytics, with limited attention to issues of accessibility, bias, and equitable participation in hybrid learning settings. Furthermore, there is insufficient empirical evidence on how educators interpret and utilise AI-generated insights to inform inclusive curriculum design and intervention strategies. This study addresses this gap by examining not only the technical capabilities of AI tools but also their pedagogical and ethical implications, thereby contributing to a more holistic understanding of inclusive learning analytics in hybrid education environments.

Learning analytics is a dynamic field that focuses on the collection, measurement, analysis, and reporting of data related to learners and their contexts (Osakwe et al, 2022). It aims to enhance educational experience by providing insights that can inform teaching practices, improve student outcomes, and facilitate institutional decision-making. Therefore, the integration of learning analytics with AI in blended learning environments significantly enhances educational outcomes by enabling data-driven decision-making, personalizing learning experiences, facilitating early interventions, boosting student engagement, assessing learning outcomes effectively, and promoting collaboration among educators as highlighted from the findings of the study. These elements collectively contribute to a more effective and responsive educational framework that meets the diverse needs of students.

Personalised Learning

The findings revealed that personalised learning emerged as a significant benefit of leveraging AI tools in hybrid learning environments. Participants indicated that AI-powered learning systems enabled the provision of customised learning experiences based on individual student needs, learning preferences, and academic performance. Through adaptive feedback, personalised recommendations, and targeted learning resources, AI tools facilitated greater learner engagement and supported students in progressing at their own pace. This was particularly beneficial for students from diverse educational backgrounds, as it allowed for differentiated learning support and improved accessibility to educational content. The findings suggest that personalised learning enhances inclusivity within hybrid learning environments by promoting student-centred learning, increasing academic confidence, and supporting improved learning outcomes through data-driven interventions.

Academic Performance Enhancement

The findings indicate that AI tools play a significant role in enhancing academic performance within hybrid learning environments. Participants reported that AI-supported learning platforms provided timely feedback, personalised learning support, and access to relevant educational resources, which contributed to improved understanding of course content and academic achievement. Furthermore, the use of AI tools enabled students to identify knowledge gaps, strengthen problem-solving skills, and engage more effectively with learning materials. The findings suggest that the integration of AI in hybrid learning promotes improved academic outcomes by supporting continuous learning, increasing student motivation, and facilitating data-driven interventions that enhance overall student performance and success.

The findings indicate that AI-driven learning analytics play a significant role in the early identification of at-risk students within hybrid learning environments. Patterns of student engagement, assessment performance, and learning behaviours generated through AI tools enabled lecturers to recognise academic difficulties earlier than traditional assessment-based approaches. This supports previous studies which argue that predictive analytics and machine learning models can enhance early-warning systems and enable proactive academic interventions (Siemens & Baker, 2012; Viberg et al., 2018). The results further demonstrate that AI-enabled analytics support more personalised and inclusive learning experiences. AI tools facilitated adaptive feedback, differentiated learning pathways, and targeted academic support, which participants perceived as responsive to diverse learning needs. These findings align with literature suggesting that AI can contribute to inclusive education by accommodating differences in learning pace,

prior knowledge, and access constraints (Holmes et al, 2019). By moving beyond one-size-fits-all approaches, AI-supported analytics enabled lecturers to make informed pedagogical decisions that support equity and learner diversity within hybrid learning environments. Another key finding was the role of AI-driven analytics in strengthening data-informed decision-making at both course and institutional levels. Participants reported that AI dashboards and analytics reports provided actionable insights into student engagement trends, assessment performance, and curriculum effectiveness. This supports (Zawacki-Richter et al, 2019 and Chen et al, 2020), who argue that AI in higher education has the potential to enhance institutional responsiveness and student success when analytics are integrated into teaching and support structures. However, the findings also suggest that the effectiveness of AI-based inclusive analytics depends on lecturers' data literacy and institutional support mechanisms.

Conclusion

In conclusion, this study addresses a critical gap in existing research by shifting the focus from purely performance-driven analytics to a more inclusive, equity-oriented application of AI in education. While prior studies have demonstrated the potential of AI to enhance learning outcomes and automate decision-making, they often overlook how these tools can be intentionally designed and applied to support diverse and underrepresented learners. This study contributes by highlighting the importance of integrating inclusivity into the design and use of AI-driven learning analytics, particularly within hybrid learning environments supported by platforms such as Blackboard Learn.

The findings of this study highlight that leveraging AI tools in hybrid learning environments significantly contributes to both personalised learning and academic performance enhancement within the context of inclusive learning analytics. AI-powered technologies enable the delivery of customised learning experiences through adaptive learning pathways, personalised feedback, and targeted academic support that cater to individual learner needs and preferences. This personalised approach fosters greater student engagement, inclusivity, and self-directed learning, particularly among diverse student populations. Furthermore, AI-driven learning analytics facilitate the continuous monitoring of student progress, enabling the early identification of learning challenges and the implementation of timely interventions. As a result, students are better positioned to improve their understanding of course content, strengthen their academic competencies, and achieve enhanced learning outcomes. Therefore, the integration of AI tools within hybrid learning environments serves as a valuable mechanism for promoting inclusive education, supporting student success, and improving overall academic performance in higher education.

This study concludes that Artificial Intelligence (AI) plays a significant role in advancing inclusive learning analytics within hybrid and digitally mediated learning environments. The findings demonstrate that AI-driven analytics enhance the capacity of higher education institutions to move beyond traditional, reactive approaches to student support toward more proactive, personalised, and data-informed practices. By enabling early identification of at-risk students, AI tools support timely academic interventions that are critical for improving retention and student success, particularly among diverse and underprepared learner populations. The findings further emphasis that AI tools can play a transformative role in identifying learning disparities, enabling early interventions, and supporting personalised learning pathways. However, the study also underscores that the effectiveness of these tools depends on how educators interpret and apply AI-generated insights within pedagogical contexts. By addressing issues of accessibility, bias, and ethical use, the study extends current literature and provides a more comprehensive framework for inclusive learning analytics.

Ultimately, this research bridges the gap between technological capability and pedagogical application by advocating for a balanced approach that combines AI innovation with inclusive teaching practices and institutional support. It offers practical and theoretical contributions by demonstrating how AI can be leveraged not only to improve efficiency but also to promote equitable learning opportunities. This positions the study as a valuable reference for future research and practice aimed at advancing inclusive, data-driven education in hybrid learning environments.

Future research should explore the long-term impact of AI-enabled inclusive learning analytics on student retention, progression, and graduation outcomes across diverse higher education contexts. Longitudinal studies would provide deeper insights into how sustained use of AI tools influences learning behaviours and academic success over time. Additionally, further research is needed to examine the ethical dimensions of AI-driven analytics, particularly issues of data privacy, algorithmic bias, and transparency, to ensure that inclusive learning analytics do not inadvertently reinforce existing inequalities. Comparative studies across institutions and disciplines, especially within resource-constrained and historically disadvantaged contexts, would also enhance understanding of how contextual factors shape the effectiveness of AI in inclusive learning analytics. Finally, future work should investigate lecturers'

data literacy and professional development needs to support meaningful interpretation and pedagogical use of AI-generated insights.

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