Generative AI Tools in Teaching and Learning: An Enabler to Creating Work-Ready Students in the 4IR

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Abstract: Higher education is experiencing a paradigm shift with the advent of generative artificial intelligence (AI) tools and large language models. This transformative approach is revolutionising education and the world of work and, if harnessed correctly, has the propensity to shape future minds. The study sought to understand academics and teaching and learning (T&L) specialists' perceptions at a private higher education institution (PHEI) in South Africa on how Generative AI tools should be used in T&L to prepare students adequately for the world of work. This qualitative exploratory study purposively selected 40 academics and T&L specialists across ten sites from a PHEI in South Africa. Three themes emerged from the data: curriculum integration, discourse, partnerships and collaboration and training and awareness. To prepare students for the world of work that uses AI, it is important to integrate Generative AI into the curriculum and teaching and learning, considering industry-specific requirements through continuous discourse, partnerships and collaboration between stakeholders. The training and awareness of Generative AI tools are necessary for lecturers and students to understand better how to use Generative AI tools correctly and responsibly.

Keywords: Artificial intelligence, Generative AI tools, Private higher education, Students, Teaching and learning, Work-ready

1. Introduction

The evolution of technology is vast and, when misunderstood by users, can create a divide in adoption and use. As a result, over the last decade, there has been a growing interest in integrating technology into higher education institutions (HEIs) based on its understanding, capital contribution, and willingness to adapt to technological changes (Dignum, 2021). A contemporary exponential growth in technology uptake in HEIs can be seen through artificial intelligence (AI) (Selwyn, 2022).

The relevant integration of AI into the world of work and society is growing at a rate that many are still struggling to comprehend. However, those who can grasp the comprehensive breadth and depth that AI integration brings to an organisation or HEI can fully leverage AI's capabilities through streamlined applications ((Xie et al., 2021)). This results in improved efficiencies, innovation, profitability, and customer service. AI is fast becoming the new norm, and as industries and societies begin to adopt and integrate AI into their daily practices more smoothly, there is a conscious and heightened need to integrate AI into HEIs' T&L strategy to ensure that students are equipped with the relevant technological skills for the world work, enabling them to readily integrate into the job market. Hence, a radical shift in T&L pedagogies needs to occur, which, if done correctly, will also translate beyond the traditional classroom (Holmes and Tuomi, 2022) and impact the students' personal, social, and professional lives. The deliberate integration of generative AI into HEI will result in a radical disruption of the existing stasis of an HEI, which can result in fear of the unknown or misunderstanding of the power of AI (Niemi and Liu, 2021) if a lack of adequate AI literacy prevails.

From a global perspective, the United Nations Educational, Scientific and Cultural Organization (UNESCO) recommends that the inclusion of generative AI be integrated into students' curricula in consultation with stakeholders so that opportunities are leveraged and challenges are minimised to create a cohesive and inclusive society, economy, and world of work to ensure that they produce graduates who are easily absorbed by the labour market and have the required skills, competencies, and attributes that are viewed favourably by the industry(UNESCO, 2023; Ramos, 2022). To this end, the study sought to answer the following research question:

- How can the PHEI ensure that T&L enables students to learn about Generative AI, learn with Generative AI, and thrive in a world with Generative AI?

2. Literature Review

AI has been used prominently in educational institutions, from computer-related technology to web-based and online intelligent education systems and integrated computer systems that use chatbots and humanoid

robots (Holmes and Luckin, 2016). This evolution in computerised technology in education has assisted educational instructors, lecturers, and administrators in performing various tasks and duties more efficiently and effectively (Singh and Hiran, 2022). In some cases, it has also completed time-consuming tasks in minimal time on behalf of educational instructors, lecturers, and administrators so that they can focus on customised learning experiences that require a more in-depth instructor approach (Chen *et al*., 2020).

- AI's Position in the World of Work

The role of AI will vary across sectors, with a marginal- to niche adoption of AI in manufacturing and service sectors, while employment and labour markets will see wider adoption of these applications (Hammer & Karmakar, 2021). George and Wooden (2023) expand on this claim; they explain that the digital marketing, customer support, healthcare, education, and e-commerce sectors have yielded positive results from using AI-based chatbots. Introducing AI-driven solutions for business is the leading trend in contemporary businesses.

The practical implications of AI in the world of work can see the creation of new functional departments that will facilitate the relationship between the employee and the AI system, a shift in the mindset of employees where there is a conscious recognition of the roles played by AI agents and a contemporary theory or framework for business to reference, given the introduction of this new dynamic organisational contributor (Farrow, 2022; Jarrahi *et al*., 2022; Nimmi*, Vilone, and Jagathyraj*., 2021). Contemporary organisations wanting to integrate AI into their operations and organisational structures efficiently must ensure stakeholder buy-in; any hesitancy towards integrating AI may be met with declining productivity (Ruel and Njoku, 2020). A shift is needed for the greater good; instead of employees competing with technology, they should work harmoniously with technology.

- The Power of AI for Students

There are fundamental lessons when using AI to empower students, namely: including the youth in discussions that affect them, being inclusive in design (i.e., being non-discriminatory against those with different physical or learning abilities), democratising educational material so that students are empowered with AI, and addressing any potential bias in AI (Hawkins and Ciarrusta, 2023). The use of Generative AI tools, such as large language models (LLM), in advancing academia and librarianship is viewed with excitement and hesitancy (Lund and Wang, 2023). As a result, the onus rests on the institution to ensure that effective ways of working alongside technology to enhance academic deliverables are met, as opposed to academics misusing these tools in a hasty effort to create new educational knowledge (Holmes and Tuomi, 2022).

When entering the world of work, graduates will face practical applications that they would not have encountered before (Tuomi, 2018); thus graduates should be equipped with a wide range of practical skills to manage the vast applications of the world of work that are necessary for the respective industries; in order for organisations to maintain a competitive advantage in the market, they would actively need to leverage the utilisation of the Internet, technology, and AI together with those willing to do so. Organisations will have to take entrepreneurial risks to ensure commercial success (Makridakis, 2017). Examples of the most common educational technology platforms that have seen the fastest uptake in AI use are 1) virtual mentor, 2) voice assistant, 3) smart content, 4) presentation translator, 5) global courses, 6) automatic assessment, 7) personalised learning, and 8) intelligent tutoring systems (Schmelzer, 2019; Fitria, 2021). While a growing number of resources are dedicated to integrating Generative AI tools into T&L, there is equally a growing concern about understanding and reflecting on these practices. Zawacki-Richter et al. (2019) conducted a systematic review of AI applications in HE and noted concerns about a lack of critical reflection on the risks and challenges of AI in HEIs, a lack of understanding from a pedagogical perspective, as well as the lack of a deeper understanding of the ethical and educational perspectives of AI applications in HEIs.

- Institutional Guidelines for T&L

The use of AI has steadily been introduced into various educational institutions. However, over the last five years, there has been a rapid uptake in the number of Generative AI tools that have entered the market, such as LLMs like ChatGPT. This uptake has profoundly affected higher education (Schiff, 2022). Therefore, it has become imperative for HEIs to invest in a guiding document or policy that addresses the incorporation, integration, and, ultimately, the use of various Generative AI tools in student T&L and assessment of students (Tuomi, 2018). As a result, institutions should consider formulating essential guidelines that will serve as best practices, protect against unethical practices from students and lecturers and prepare for future evolutions in

Generative AI tools for higher education (Chan, 2023). The absence of such can perpetuate unethical academic performance in teaching, learning and assessment practices.

Some of the guidelines that institutions should be cognisant of include understanding the types of Generative AI tools that are available in the market, how these tools relate to specific academic disciplines, understanding the nature of Generative AI tools, and choosing the most suited ones for an assessment, and to ensure that the chosen AI tool is aligned with the academic needs of students and the institutional goals and objectives. It should provide clear communication through training sessions on how the chosen Generative AI tools are expected to be used to complement and supplement T&L activities in a classroom, encourage open and honest discussions within the institution and amongst students to gauge stakeholder buy-in and participation, and finally, to continuously engage in these practices so that the institution can refine its approach to AI and T&L practices for the betterment of students (UNESCO, 2021; Schiff, 2022; Utah Tech University, n.d.).

3. Research Methodology

The study sought to answer the following:

- How can the institution ensure that T&L enables students to learn about Generative AI, learn with Generative AI, and thrive in a world with Generative AI?

The study was exploratory, as there is little previous research at present to serve as a reference point on the perceived use of Generative AI tools, including LLMS, in higher education and the ability to adequately prepare students for the world of work . Using a qualitative methodological approach, the study sought to understand academics and T&L specialists' perceptions at a PHEI of their subjective experiences and views of the phenomenon under study. The study sought the perceptions of academics and T&L specialists before the PHEI took a formal stance on using these tools at the institution. The study was cross-sectional. For the study, Generative AI tools included, but were not limited to, CHATGPT, BING's Copilot, Midjourney, and DALL-E.

Data was collected using an open-ended online questionnaire comprising unstructured questions to assess the research question. An online questionnaire was deemed the most suitable instrument regarding the geographical reach of the PHEI campuses and the accessibility and availability of the target population. The PHEI Postgraduate and Research Ethics Committee reviewed the instrument, and two academics from the institution reviewed the instrument for clarity. Data were collected using the online survey platform Microsoft Forms from 03 April 2023 to 15 April 2023.

The targeted population was academics and T&L specialists at a PHEI across the ten delivery sites, with an approximate population size of 180. The survey link was distributed to the targeted population via email, by the institution's central information technology department, using purposive sampling. The participants had to be an academic or a T&L specialist and be employed at the PHEI. Participants of all races, genders and ages were included. The survey was closed after 40 responses were collected due to data saturation being achieved. Using Nvivo 12 Pro software, content and thematic analysis using inductive reasoning were performed on the data to establish trends and patterns. Three themes emerged from the Nvivo analysis.

Ethical clearance for the study was obtained from the PHEI Postgraduate and Research Ethics Department in accordance with its ethics review and approval procedures (R.00084).

4. Results

Based on the data collected, the following section presents the three emerging themes: Curriculum Integration, Training and Awareness, and Discourse, Partnerships, and Collaborations.

- Curriculum Integration

Many participants noted that module outcomes should be updated to incorporate industry-specific AI requirements and to integrate AI into the classrooms, curriculum, and assessments.

Participant 1 makes a valid point that for T&L to be effective and achieve the desired outcome, it is important for the institution to "*Meet students where they are and be able to adapt teaching in accordance with the latest AI advancements*."

Participants 2, 8, 19, 33 and 35 advised to "*Incorporate it into content, assessments and classrooms and T&L strategy,"* with Participant 8 suggesting *"teaching them how to use it correctly for their specific qualification and career, and how it can be useful or not within their future career".*

Participant 7 proposed that "*By ensuring that industry-specific AI Learning Units / Learning Unit Outcomes are effectively implemented into other appropriate modules within each and every degree ",* with Participant 16 indicating that "*Digital citizenship must be a module in all programmes."*

However, Participant 35 postulated that the PHEI should first understand what *"Generative AI tools are used in different industries"* before integrating them into the T&L strategy and curriculum.

Participant 10 said, "Introducing students to different Generative AI tools in modules and in the classroom is a start, and even using Generative AI tools as part of lectures could benefit *students*. Participant 14 had similar sentiments*. "We need to bring this into the classroom, emphasise these tools' augmentative role, and let them use it in such a manner. "* Participant 15 suggested, *"Use generative AI for possible class activities and scenarios, such as analysing AI responses to assess their relevance and evaluating what you would do differently. "*

Participant 20 painted a very bleak picture if Generative AI tools were not incorporated into T&L: "*They will fail in the workplace if we do not integrate AI into our T&L, and tertiary study as it exists today will become irrelevant*", and Participant 32 advised the PHEI to "*Allow the use but change the way we question and interrogate the knowledge*."

Participant 10 felt, "*We may need to consider prescribing Generative AI tools within study material and even allowing students to access AI within certain assessment parameters. This may also necessitate a move from paper-based material to going totally online in the near future*."

Participant 35 asserted that the PHEI needs to "*Create an enabling environment that allows AI to take place in moderation and understanding*."

Over and above the PHEI creating an enabling environment, Participant 36 noted, "*We need to inculcate AI into our DNA, curriculum, T&L strategy and create innovation hubs. It must become part of our daily lives."*

Most participants did not use Generative AI tools, and some used them in their personal capacity or for their research, but not in the classroom. Hence, most participants are unaware of the various Generative AI tools, their capabilities, and their associated limitations. Thus, sentiments around the need for educating, demonstrating the correct use, and allowing students and lecturers to use AI emerged prominently to ensure that the benefits of AI, accompanied by its ethical and responsible use, are realised optimally.

To get students to learn about AI, learn with AI, and thrive in a world with AI, Participant 4 advised that "*We as educators need to guide them correctly from the start, the same way students are guided with social media*," with Participant 5 encouraging the use because "*Like with everything else...practice makes perfect*."

Participant 3 argued, "*We should be demonstrating, promoting and allowing the use of any tools they will face in the world of work."*

Participant 11 indicated, "*Let the student use it and understand the wonders and dangers of AI. Students must understand that many white-collar jobs, such as marketing/advertising managers, accountants, contract lawyers, etc., may disappear. They must choose wisely; otherwise, they will sit without a job."*

Participant 18 felt that AI should be *"introduced in all stages of learning, including primary, secondary and tertiary,"* because *"Students should be educated on "AI literacy" to prevent the dumbing down of society,"* as alluded to by Participant 4.

Participant 15 stated, *"We need to adapt to the change in technology. Students will use it. It boils down to academics being adequately trained in the intended use and purpose of the tool and developing our students in the same manner."*

Participant 22 noted, "*Students should be educated on ethical use and misuse and provided with learning opportunities to ensure students are on an even playing field, despite varying levels of tech-savviness and access to technology."* Participant 25 shared similar sentiments: *"The best way to prepare students for the world of work is to use Generative AI tools and teach them how to use them correctly, responsibly and ethically."*

To assist students in understanding the key uses of generative AI and to use it responsibly, Participants 29 and 40 advised that *"A dedicated course on Generative AI tools" be created.*

The need to educate and train staff was also noted among many participants, with Participant 38 summarising the key points: "*We should first know how to use it. Staff should be trained; teaching and learning strategies need to be revisited. If we, as the holders of all knowledge, cannot figure out how to do it, we will not be able to prepare students for the world of work. As an educator and researcher, the institution should have been ahead of the curve and empowered us to utilise the tools. The students know all about it and are already using it*."

- Discourse, Partnerships, and Collaborations

In addition to providing training and increasing awareness of AI, its uses and ethical implications, participants also expressed the need for discourses, collaboration, and partnerships with various stakeholders from other HEIs or industries.

Participant 10 suggested, *"It may also be worth getting guest lecturers from industry who are actually using Generative AI tools in the workplace to show students what awaits them in the world of work."*

Participant 28 indicated, *"Students will generally be way ahead of their lecturers... this is THEIR world. Guests from the world of work need to collaborate with developers and lecturers to expose students to the practical uses and implications.*

"We need to revisit our Teaching and Learning strategy. We need to embrace AI at the highest levels. We need to research what other thought leaders in this area are doing and mimic what works well," argued Participant 38.

4.1 Implications of the Findings

PHEIs must be agile in adopting Generative AI and not be bureaucratically outdated despite their resistance to change (UNESCO, 2023). Generative AI tools should be used to support and not replace T&L and assessments. The use of AI is not to replace existing teaching strategies, but it rather serves as a tool in working with available technologies that are already in use better to support its ethical, deep-learning, creative-solutions formation, and scaffolding in students where information dissemination and teaching away is not the sole responsibility of the lecturer (Bearman, Ryan and Ajjawi., 2022). It will allow for better management of students and the student learning journey by awareness of how to leverage its use to promote smarter T&L whilst harnessing more efficient ways of thinking, methods of assessment, and critiquing baseline automatically generated AI information.

PHEIs must ensure continued involvement with key stakeholders in the industry that will guide the integration of Generative AI tools into higher education. PHEIs should establish industry partnerships (Ramos,2022), especially for professional qualifications where macroeconomic trends and guidelines continuously change. This will allow PHEIs to update the content and assessments accordingly so that industry needs are met comprehensively. The current and future curriculum design and PHEI qualifications must be flexible enough to accommodate changes and allow the seamless integration of technology-driven solutions, such as Generative AI tools. The converse can lead to the PHEIs having redundant qualification offerings resulting in unemployment (George and Wooden, 2023) if they have been too stringent in their original design that did not permit valid updates to the qualification. Further to this, T&L pedagogy must be thoroughly investigated, and key pedagogical teachings must be used to support the application of AI in curriculum and assessments (McGehee, 2023). PHEIs must ensure that existing T&L practices are critiqued so that future applications can harness value from these pedagogies within a new frame of Generative AI tools and AI reality in the curriculum. It is further recommended that AI-Education framework be created to guide T&L and that the policies and regulations of the PHEI be updated to include AI and the parameters within which it can be used (Chan, 2023; UNESCO, 2023) as the ethical aspects of AI are a concern to lecturers (Pisica et al., 2023).

Stakeholders responsible for delivering academic material, namely lecturers, must demonstrate AI literacy (UNESCO, 2023; Kuka *et al*., 2022) before integrating AI into their teaching, learning, and assessment practices. There must be a deliberate initiative from the PHEI to ensure that awareness of Generative AI tools is brought to the attention of key academic stakeholders, as well as ensuring that training is conducted for lecturers and students (MacGregor, 2023) on how to engage with Generative AI tools (Chan, 2023) and to work effectively alongside technology (Holmes and Tuomi, 2022). They should be competent to work with AI and Generative AI tools before engaging with it with appropriate support in place (Ocaña-Fernández, Valenzuela-Fernández and Garro-Aburto, 2019). The absence of this will cause a ripple effect in that lecturers would be hamstrung in evolving their T&L best practices, and T&L managers would not be correctly addressing the market needs.

Students will be presented with an added complexity to their learning journey; they will be challenged to meet the industry graduate skills and fluid integration into the world of work (Xia and Li, 2022). As it stands, South African students are already faced with many challenges that hinder their ability to access and succeed in higher education. PHEIs must also hedge against integrating Generative AI tools into teaching, learning, and assessment in a manner that would create additional barriers to entry and learning.

Using Chen *et al*. (2020) model of Technology Structure of AI Education, the PHEI can work to integrate the use of AI in their curricula, teaching, learning and assessments and to facilitate the adoption of AI by the various stakeholders at the PHEI, the Unified Theory of Acceptance and Use of Technology model (Chatterjee and Bhattacharjee, 2020) is recommended. PHEIs should consider creating a collaborative platform for all stakeholders involved in curriculum development, assessment development, and facilitation to share best practices and innovative ideas towards AI integration (McGehee, 2023). This would also provide the PHEI with an indication of which resources are viewed more favourably and which resources are not leveraged by stakeholders, including students.

Furthermore, PHEIs must conscientiously develop partnerships between themselves and other PHEIs, non/governmental organisations and privates to foster learning between peers and share ideologies and learning strategies on digital technologies, especially AI (UNESCO,2023). PHEIs can no longer view education as a solo initiative; rather, broadly, as a society, it becomes our responsibility to ensure that students are provided with the necessary capacities, skills, and attributes to contribute positively to the country's economic output. Although it is essential for PHEIs to engage with Generative AI tools and develop the competencies and skills of all involved in the development and dissemination of curricula, equal importance is placed on understanding how and why these initiatives are undertaken, relevance to the discipline, industry and professions hence the importance of conducting regular reviews and collaborations with stakeholders cannot be underscored (Nkulu-Ily, 2023; UNESCO, 2023). It is no longer acceptable for PHEIs to simply demonstrate their Generative AI support, but a more holistic approach to this integration is required; this must be facilitated through continuous improvement. The notion of continuous improvement can also be supported through dedicated capacity building and a quality assurance framework (UNESCO, 2023) that PHEIs can invest in developing that will systematically integrate all AI, assessment, and T&L components such that robust diagnostics can be run.

5. Conclusion

There is a pressing need for PHEIs to adapt to the changing needs of the world of work by ensuring that graduates exit with the desired skills, competencies, and attributes. PHEIs must invest in the training and development of T&L managers, curriculum and assessment developers, and lecturers so that this knowledge and competencies can be efficiently delivered to students. Furthermore, there must be deliberate intervention from PHEIs through programmes, training, and short learning programmes that create AI literacy and competencies for students. Before students can learn with AI and thrive in a world led by AI, the foundational building blocks of understanding what AI is, its benefits and limitations, and how to use it correctly and responsibly are crucial. This study was limited to a single PHEI in South Africa prior to the PHEI taking a formal position on the use of Generative AI tools in the institution. Therefore, it is recommended that a similar study be conducted among other private and public HEIs nationally and abroad to establish if similar perceptions prevail there. A post-study should also be conducted when institutions have a formal position on the use of AI, to establish if perceptions have changed. To attain a holistic view of the use of Generative AI tools in equipping students for the world of work, it is further recommended that perceptions of students, recent alumni, and industry stakeholders should be attained.

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