Chapter 1

Benefits and Challenges of Using ChatGPT in Higher Education (HE) Teaching and Learning (T&L): Systematic Review

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Abstract

Recently, several studies discussed the use of ChatGPT in teaching and learning and the ethical considerations. ChatGPT is a technological innovation that enables natural language interaction with an Artificial Intelligence (AI) model. This chapter explores various options of using ChatGPT and AI chatbot tools in teaching and learning as well as summative assessments in line with United Nations Sustainable Development Competence. This chapter explores challenges and potential areas for adoption that could be utilised by higher education institutions (HEI) as a framework for utilisation of ChatGPT for effective learning. The outcome of the guides quality assurance and accreditation regulatory to design a set of standards that could be utilised by HEIs.

Keywords: ChatGPT; chatbot; quality education; sustainability; teaching and learning; assessment; SDG4

1. Introduction

ChatGPT is a technological innovation that enables natural language interaction with an AI model. Its ability to generate human-like responses and provide information on many topics makes it valuable in education. It can be accessed via online platforms, making it accessible to students and instructors. It can be

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integrated into learning management systems (LMSs), virtual classrooms or used as a standalone tool. Its adoption in higher education (HE) refers to the decision by instructors and institutions to incorporate it into teaching and learning practices and to encourage students to use it. In this respect, it is similar to many other online information systems, from the most general, such as search engines, to the most particular, e.g. financial information systems. The use of ChatGPT in HE teaching and learning (T&L) can be analysed via innovation theory, which gives a framework for understanding diffusion, adoption and impact of new technologies. Innovation theory suggests that diffusion of a new technology is influenced by several factors, including the innovation's characteristics, communication channels used and the social system in which it is introduced. This chapter will provide literature review systematic analysis highlighting innovative methods that could be used as a guideline while utilising ChatGPT in HE T&L.

2. Adoption of ChatGPT in HE T&L

A study was conducted in Poland stating that adoption of AI tools in HE in T&L is required; however, it could rely on behavioural aspects from students' perspective (Strzelecki, 2023). In terms of usefulness and easy to use, studies stated that although ChatGPT was found useful in providing immediate responses, however Choudhury and Shamszare (2023) stressed upon the trust of the information generated from such tools, specifically in terms of information that is related to healthcare. In similar context, the necessity of investigating factors effecting adoption of ChatGPT and AI tools in HE T&L was stated in several studies with a focus on reviewing HE T&L strategies to support academic integrity and academic misconduct. On the other hand, Foroughi et al. (2023) stated that ChatGPT could revolutionise education if utilised effectively; however, there are areas to be considered by HE while adopting ChatGPT as T&L tool, for instance, ChatGPT lacks highlighting cultural sensitivity and issues related to gender equality issues. Therefore, a careful review must be maintained by academics to ensure presented data are appropriate if used for T&L. In addition, Raman et al. (2023) stated that ChatGPT is found effective to support students to communicate if a different way by providing ease to use and accessibility. However, ChatGPT does not capture emotional intelligence interactions, and hence, emotional and social interaction skill maybe lacking unless it is tackled by policymakers and regulators.

United Nations highlighted the need to inculcate ICT skills and competency to support sustainable quality education. It was argued that the use of AI tools will improve integrating skills related to science, technology, engineering and mathematics (STEM). In the contrary, it was stated that although such tools are limited to support integrating ICT skills; however, it still requires setting clear strategy to foster engagement (Vasconcelos & Santos, 2023).

To support adoption, UNESCO established a guideline for the education sector to support HE while considering utilising ChatGPT in different T&L activities. As highlighted by Sabzalieva and Valentini (2023), the students

consider ChatGPT as a motivator, personal tutor, dynamic assessor and collaborative coach. The students find such AI tools including ChatGPT user-friendly and easy to use and accessible.

In summary, adoption is influenced by factors such as institutional culture, faculty attitudes, and student expectations. Resistance to change and concerns about the authenticity of AI-generated content might hinder diffusion, while positive perceptions of AI and its potential benefits can facilitate adoption. From the above-mentioned studies, several studies were conducted highlighting the need for further investigation of adoption of AI tools including ChatGPT in HE specifically in terms of T&L.

2.1 Perceived Usefulness

Cardona et al. (2023) stated that chatbot is found useful for students as well as faculty; however, there are several legal and policy issues that should be considered. The question arising question such AI tools could it be trusted in the education sector. Therefore, it was recommended to investigate further and devise policies that support integrating ethical standards into the use ChatGPT and similar tools. In addition, Cortiñas-Lorenzo and Lacey (2023) stated that teachers age and digital skills ease the usefulness and easy to use of such tools, a study was conducted that reflected the necessity to consider social language and pro-activeness while designing teaching strategies supported by AI tools, a consideration of the field of study and level is also required to ensure attainment of the required learning outcome. In similar context, Romero Rodríguez et al. (2023) urged researchers to investigate the quality of education supported by such AI tools specifically in terms of ethical standards as well as practical application, whereas Chen et al. (2020) investigated the usefulness of AI tool and chatbot in higher education focusing on Chinese universities and noted that such tools support the attainment of the course learning outcomes by providing additional informal learning. Based on the previous studies, it is visible that ChatGPT is found useful at both student and faculty level in terms of supporting education. It is worth considering that ChatGPT could be a supporting educational tool with clear usage guidelines and regulations focusing on ethical standards and cultural sensitivity.

2.2 Ease of Use

As stated by Colace et al. (2018), faculty member requires knowledge and motivation to support creating awareness of the ease of use. In terms of ease of use, students found that use of AI and chatbot including ChatGPT is easy to use and provides relevant information to support their progression. Studies proven that AI and Chatbot are found easy to use and support learners in various fields, specifically Information Technology and Engineering Programming. A study was conducted recommending Phython-Bot as it was found easy to generate programming language through such tools (Okonkwo & Ade-Ibijola, 2020). In similar context, Vanichvasin (2021) stated that chatbot and AI tools including ChatGPT support conducting research at course level. The ease to use may be appreciated from a context to

another, for instance, a study was conducted at Ghanaian higher education which reflected a positive impact on student performance; tools including ChatGPT were used as teaching assistive tools with formal percentage integrated within the curricula (Essel et al., 2022). The ease of use and accessibility of such tools supports sustainable education in line with United Nations Sustainable Development Goals (UNSDGs). For higher education in non-developed countries, such AI and Chatbot tools with free access could support the overall learning experience. In similar context, it was proposed to develop a specific chatbot for higher education in Thailand, the study recommended to generate a smart script with specific focus on certain fields related to Thailand. According to Georgescu (2018), chatbot is expected to improve the quality of life, as it is easy to use and provide access through different devices including smart phones, personal computers and tablets.

2.3 Institutional Support

A study was conducted in India stating that the use of AI and Chatbot including ChatGPT improves student learning experience (Sandu & Gide, 2019); it was found that such tools improved productivity and support faculty and students by providing information and reducing ambiguity. Moreover, Hien et al. (2018) urged higher education institutions (HEIs) to relay on AI and Chatbot to improve student administrative support services, as such tools allow tracking the number of issues raised by students and enable instant responses which helps in improving student satisfaction. Therefore, it was suggested to increase the usage of such tool for academic and non-academic issues to support the overall higher education performance and effectiveness. In similar context, Khidir and Sa'ari (2022) emphasised that chatbot including ChatGPT is found as a useful tool and hence should be a core of HEI services as it available for student 24/7 which reduces the workload on faculty and admin staff and hence allows the faculty to be intellectually contributing and publishing research. Although several researchers argued that AI tools are found effective and supports the overall HEI performance. However, researchers argue that there is a need to improve the design of such tools to be catered to assist the students and faculty with clear policies and procedures (Bahja et al., 2019). The importance of continuous development was raised by researchers, for instance, Merelo et al. (2023) and Al-Hawaj (2021) stated the need of developing faculty members to be able to adopt to the dynamic updates to the technology and the use of AI tools, which includes designing courses with specific materials and assessment that optimise such tools (Table 1.1).

3. Benefits of the AI Tools, Chatbot and ChatGPT

3.1 Student Perspective

Based on the systematic literature review conducted, several benefits of AI tools, chatbot and ChatGPT, were identified from student perspective. According to

Table 1.1. Summary of Identified Factors Influencing Adoption While Utilising ChatGPT – By Authors.

Factors	**Guiding Actions**
Perceived usefulness:	Instructors may perceive ChatGPT as useful for enhancing student engagement, providing personalised feedback and supporting learning activities such as problem-solving or language practice. Its ability to handle large volumes of queries and give instant responses can be advantageous.
Ease of use:	The ease of integrating ChatGPT into existing teaching practices, such as incorporating it into online discussion forums or assignment feedback, can influence adoption. Its user-friendly interface, clear instructions and intuitive design are important.
Institutional support:	The support and resources provided by higher education institutions, such as training programmes, technical assistance and infrastructure, can encourage instructors to adopt ChatGPT. Institutional policies and guidelines regarding the use of AI technologies also play a role.

Note: Content of the table generated by authors based on systematic review analysis.

Kasneci et al. (2023) instant information and access to materials was found one of the most beneficial; ChatGPT can provide students with quick answers to their questions, eliminating the need to wait for responses from instructors or search for information independently. Therefore, using AI tools, chatbot and ChatGPT as assistive technology in T&L is expected to save time and facilitate learning by providing immediate access to relevant content. ChatGPT was also considered as a tool towards personalised learning (Limo et al., 2023). ChatGPT can give personalised feedback and support tailored to individual students' needs. By analysing students' queries and responses, ChatGPT can adapt its interactions to provide targeted guidance and assistance, helping students in their learning journey. In addition, enhanced engagement and motivation was also found one of the benefits of the use of ChatGPT (Adiguzel et al., 2023), the interactive nature of ChatGPT can promote student engagement. Students may find it more enjoyable to interact with an AI chatbot, as it can create a conversational and interactive learning environment. This engagement can foster active participation and motivation. Furthermore, Zhai (2022) stated that students found AI tools, chatbot and ChatGPT highly supportive to the learning curve through availability beyond traditional class hours; ChatGPT can be accessible 24/7, allowing students to seek help and clarification outside regular class hours. This can be particularly beneficial for distance learners, part-time students or those facing

time constraints. It is also worth mentioning that the availability of information allows unprivileged students to get access to information free of cost, and hence, it allows learners progression.

3.2 Academic Faculty Perspective

Halaweh (2023) highlighted that HEIs should have a clear strategy to optimise AI as part of the current resources which include chatbot and ChatGPT. In this context, Janahi et al. (2023) emphasised that the use of AI tools, chatbot and ChatGPT, as part of teaching and learning could support time-saving and efficiency provided that clear T&L strategy is set by the institution; ChatGPT can assist lecturers by providing instant responses to frequently asked questions, reducing the time spent on repetitive queries. This allows lecturers to focus on other aspects of their teaching, such as facilitating discussions, designing engaging learning activities and providing individualised support to students as well as improve the workload by allocating extra time for research and other intellectual experience. Furthermore, Eager and Brunton (2023) stated that augmented teaching resources is also considered one of the benefits. ChatGPT can serve as a valuable teaching resource, offering additional information, examples and explanations beyond what a lecturer can provide within the limited timeframe of a lecture. Lecturers can leverage ChatGPT to supplement their instructional materials and provide students with enriched learning resources. However, there is a need to redesign the course delivery and materials by utilising ChatGPT at assistive technology considering critical thinking assessments and clear ethical standards. Two common benefits were found between students and academic faculty. Perer and Lankathilaka (2023) stated that personalised feedback and support is considered a benefit from academic faculty perspective. ChatGPT can help lecturers provide personalised feedback to students at scale. By analysing students' interactions with the chatbot, lecturers can gain insights into individual learning needs and tailor their guidance accordingly. This can promote a more personalised learning experience for students. In addition, Adiguzel et al. (2023) stated that enhanced student engagement is highly beneficial from academic faculty and student perspective. The interactive nature of ChatGPT can help engage students who may be reluctant to participate in class discussions or ask questions in a traditional setting. ChatGPT's conversational approach can create a comfortable and non-intimidating environment for students to seek clarification and engage in dialogue. Specifically, during COVID-19, academic faculty stated that chatting through microsoft teams and student engagement had its advantages and disadvantages; the availability of the chatting tool enabled students to be motivated to share comments and questions (Table 1.2).

Based on the systematic review conducted, it is visible that ChatGPT can enhance student engagement by providing interactive and personalised learning experiences. It can support instructors in addressing individual student needs and facilitating self-paced learning. In addition, ChatGPT can provide instant feedback, answering common questions and supporting student enquiries outside of

Table 1.2. Summary of AI Tools, Chatbot and ChatGPT Benefits by Different Stakeholders.

Benefits	Stakeholder (s)	Reference
Instant information	Students	Kasneci et al. (2023)
Availability beyond traditional class hours		Zhai (2022)
Time-saving and efficiency	Academic Faculty	Halaweh (2023)
Augmented teaching resources		Eager and Brunton (2023)
Enhanced engagement	Students and Academic Faculty	Adiguzel et al. (2023)
Personalised feedback and support		Perera and Lankathilaka (2023)

Note: By Authors 2024 – Content of the table generated by authors based on systematic review analysis.

traditional class hours. These benefits could be used towards setting a clear strategy for sustainable quality education AlDhaen (2023, 2024), however it is also worth considering the challenges and concerns Mhlanga (2023) including ethical standards and creating awareness of academic misconduct. The following section will provide an overview of the current literature review on the challenges and concerns related to the use of AI tools, chatbot and ChatGPT from student and academic faculty perspective followed by conclusion with recommendable actions for policymaking.

4. Challenges and Concerns Related to the Use of AI Tools, Chatbot and ChatGPT

4.1 Student Perspective

Although AI tools, including chatbot and ChatGPT, have proven its usefulness is several areas related to T&L, however the issues of reliability and accuracy are still arising. For instance, Shen et al. (2023) stated that ChatGPT generates responses based on patterns learned from training data, so its information may be inaccurate or unreliable information. Students may have concerns about the quality and validity of the responses they receive, especially if they are not clearly informed that they are interacting with an AI system. It is also a concern when the information is generated to medical education or healthcare sector (Johnson et al., 2023). According to (Shidiq, 2023) the use of ChatGPT lack of human interaction, ChatGPT can provide information however it lacks the human touch and expertise that an instructor or peer interaction can offer. Students may value the guidance, insights and personalised feedback that come from direct human interactions, which ChatGPT may not be able to fully replicate. In addition, lack

of human interaction also considered a challenge on identifying sensitive information (Zhai, 2023), and hence, it impacts the overall T&L practices. As stated by Chan and Lee (2023) the usage of AI tools including ChatGPT could cause overreliance on AI technology. Students may depend too much on ChatGPT as a primary source of information, neglecting critical thinking and independent research skills. Relying solely on ChatGPT for learning may limit students' ability to explore different perspectives, evaluate information critically and engage in deeper discussions. This could lead to reduction of critical thinking competency, and hence, clear sustainable education T&L strategies should be set (AlDhaen, 2023, 2024). Ethical challenges and considerations, as stated by (Mhlanga, 2023) students may have concerns about the ethical use of AI technologies like ChatGPT, particularly regarding privacy, data security, and potential biases in the training data. They may seek transparency and assurance that their data and interactions are being handled responsibly. Therefore, educators should set a clear policies and procedures to support declaration of ethical use of data obtained from AI tools including ChatGPT.

4.2 Academic Faculty Perspective

Quality of education is a key; the use of information from ChatGPT is causing concerns from academic integrity. According to Yu (2023), lecturers may be concerned about the accuracy and reliability of ChatGPT-generated responses. Ensuring the quality of information provided by the AI chatbot requires careful monitoring, training, and regular updates to address any inaccuracies or potential biases in the responses. Therefore, there is a need to develop clear policies and procedures that support academic faculty to assure the quality of information and avoid of academic misconduct. In addition, Yan et al. (2024) emphasised the need of pedagogical alignment considering different context. Lecturers need to carefully consider how to integrate ChatGPT into their teaching practices in a way that aligns with their pedagogical goals and instructional strategies. The AI chatbot should complement, rather than replace, the role of the lecturer and the interactive learning experiences they aim to create. Therefore, T&L strategies may be reconsidered to inculcate a percentage of integrating such AI tools including ChatGPT in the curricula. However, such integration and transformational shift in T&L requires technological readiness and training. In this context, Yan et al. (2024) stated the need that educational providers must consider regular training for academics to ensure effective integration and utilisation of such tools as part of student learning. Lecturers may face challenges in their technological readiness and proficiency in using ChatGPT effectively. They may need training and support programmes to familiarise them with the capabilities, limitations and best practices of integrating ChatGPT into their teaching. In similar context, AlDhaen (2022) emphasised on integrating AI tools including ChatGPT as part of T&L by ensuring appropriate technological infrastructure to support effective implementation and institutionalisation. However, integrating technology could be costly, and therefore, a consideration of the context needs to be considered as in

some countries, access to internet maybe not covered, and therefore, students may not be able to effectively utilise the tool off campus and hence effect student learning.

One of the major challenges faced during COVID-19 and the use of technology was the lack of human interaction and engagement; hence, researchers called for setting ICT governance framework for higher education to support integrating ICT as part of overall operations within the core function of HEIs and not restricted to T&L (Alaali, 2021), for instance, academic advising, counselling and student support administration. Although the use of ICT is important, however maintaining human interaction is highly important; lecturers play a vital role in providing mentorship, guidance and expertise that ChatGPT cannot fully replicate. Lecturers may be concerned to keep the human element in education and that students still have opportunities for meaningful interactions with instructors. A question was raised by (Adnan et al., 2021) whether AI and chatbot could replace human interaction, despite the technological advancement yet human interaction and emotional intelligence is required. Therefore, more technological advancement is required to improve AI tools including ChatGPT (Table 1.3).

5. Integrating AI Tools Within LMS

We also need to consider a specific technical issue, the relationship with LMSs. The opportunities relating to LMS include:

Table 1.3. Summary of AI Tools, Chatbot and ChatGPT Concern and Challenges by Different Stakeholders.

Concern and Challenges	Stakeholder (s)	Reference
Reliability and accuracy	Students	Shen et al. (2023)
Lack of human interaction		Shidiq (2023)
Overreliance on AI technology		Chan and Lee (2023)
Ethical considerations		Mhlanga (2023)
Quality control	Academic Faculty	Yu (2023)
Pedagogical alignment		Yan et al. (2024)
Technological readiness and training		Yan et al. (2024) AlDhaen (2022)
Maintaining human interaction		Adnan et al. (2021)
Institutional policies and regulations		Alaali (2022)

Note: By Authors 2024 – Content of the table generated by authors based on systematic review analysis.

- *Enhanced student support*: ChatGPT improves student learning by customising learning resources and suggestions to meet each student's unique needs, preferences and learning styles. This individualised approach makes it easier to learn quickly and effectively (Al Shloul et al., 2024). Personalised learning ensures that students receive education tailored to their individual learning need, which eventually leads to improved comprehension and retention. Besides, Biswas (2023) indicated that ChatGPT can help and train students in real time when they run into problems or have questions since it can respond quickly and offer solutions. In addition, ChatGPT encourages learning outside of the conventional classroom context; ChatGPT may function as a virtual tutor and offer students customised, flexible feedback (Alshahrani, 2023). According to Firat (2023), integrating AI apps, application programming interface and plugins into LMSs like Canvas and Moodle can enhance e-learning efficiency and accessibility. Additionally, ChatGPT offers college-level students more educational opportunities. It can provide direction on new reading materials, assist students discover places they might have missed and strengthen current relationships with educators and peers (Bhullar et al., 2024). It's crucial to consider the unique needs of institutions and students when selecting AI solutions, such as GPT-3, which can generate reading material summaries and student-specific feedback. Furthermore, the conversational style of ChatGPT can enhance and enrich the learning process, resulting in a more profound comprehension of the subjects being studied (Nikolic et al., 2023).
- *Automation of administrative tasks*: ChatGPT is a useful tool for administrative purpose in educational institutions, especially in automating tasks, streamlining workflows and increasing productivity. For instance, chatbots with intelligent tutoring features can be integrated with LMS such as Moodle and Blackboard to streamline the administration of courses and modules (Rodway & Schepman, 2023). In academia, lecturers can also utilise ChatGPT to grade assignments and give feedback, saving them a lot of time since they would not have to spend hours grading papers (Nikolic et al., 2023); also, faculty members can use ChatGPT to create lessons and instructional materials that are tailored to the needs and abilities of each student based on current trends (Javaid et al., 2023).
- *Data-driven insights*: ChatGPT is capable of analysing student performance data and offering customised feedback and direction to assist students advance their knowledge and abilities (Zhai, 2023). Feedback is an essential part of education, and ChatGPT's diagnostic and reflective feedback integrated in Moodle helps students grow by allowing them to learn from their mistakes and move forward. Finding and fixing the source of problems can be very helpful, especially for students who are having difficulty, besides ChatGPT can be utilised in both formative and summative evaluation (Lin, 2023). According to Paunovic et al. (2023), the ability to generate coherent writing with ChatGPT can help with giving thorough feedback on assignments and tests. Its answers may consist of thorough justifications, recommendations and adjustments. Also, ChatGPT offers a fair platform for students to receive feedback, encouraging critical thinking and reducing the need for one-time offerings (Lin, 2023).

- *Adaptive learning*: According to Muñoz et al. (2022), adaptive learning also referred to as adaptable teaching involves creating customised learning opportunities to meet each person's unique training or educational needs Adaptive learning integrates many learning paths, specialised resources and prompt feedback instead of using a standard technique. ChatGPT can function as a virtual tutor and offer students individualised support by attending to their educational needs, answering their questions and providing direction on subjects (Javaid et al., 2023; Limo et al., 2023). A recent study by Neupane et al. (2024) proved that using GenAI in educational pedagogy enhances the personalised and adaptive learning experiences that ChatGPT and virtual learning assistants provide. ChatGPT improves the educational process where learner interactions are analysed by Moodle, which then adjusts content delivery and recommends learning routes based on each student's preferences, pace and background knowledge. This flexibility guarantees a learning experience that is more successful and individualised (Paunovic et al., 2023).

6. Conclusion and Future Recommendations

The challenges include:

- Integration challenges: Integrating ChatGPT into an existing LMS may require technical expertise and compatibility considerations. LMS providers need to ensure seamless integration, data synchronisation and interoperability between the AI chatbot and other LMS functionalities.
- Training and maintenance: LMS providers must invest in training the AI chatbot and continuously updating its knowledge base to ensure accurate and relevant responses. Maintenance and monitoring are needed to address any biases, inaccuracies or limitations that may arise from the AI system.
- User experience and interface design: The user interface of the LMS needs to be carefully designed to accommodate the integration of ChatGPT. It should provide a seamless and intuitive experience, allowing students to easily access the chatbot, view responses and switch between different LMS features without disruption.
- Privacy and security: LMS providers must prioritise data privacy and security when integrating ChatGPT. They need to implement robust security measures, protect student data and ensure compliance with relevant privacy regulations. Transparency and clear communication regarding data usage and storage are crucial to building trust with users.
- Ethical considerations: LMS providers should consider the ethical implications of integrating ChatGPT into the learning experience. They need to ensure responsible AI use, address potential biases and provide students with transparent information about interacting with an AI chatbot within the LMS.

The impact of ChatGPT can be assessed in terms of its benefits and potential challenges.

- Benefits: ChatGPT can enhance student engagement by providing interactive and personalised learning experiences. It can support instructors in addressing individual student needs and facilitating self-paced learning. ChatGPT can provide instant feedback, answering common questions and supporting student enquiries outside of traditional class hours.
- Challenges: The reliability and accuracy of AI-generated responses may vary, raising concerns about the quality of information provided. Instructors need to carefully design and monitor the use of ChatGPT to ensure that it complements their pedagogical approaches and does not replace important human interaction and critical thinking skills.

7. The Way Forward

Regulatory and Quality Assurance bodies as well as HEIs must develop a clear guideline to support the use of ChatGPT in HE teaching and learning including formative types of learning as well as summative types of assessments that is critical thinking based to allow students to utilise such tools as a secondary material rather than an actual mean of response. The HEIs should develop clear assessments guided by rubrics that allow critical and innovative thinking rather than addressing basics and principles which is in line with United Nations Sustainable Development competence. The role of accreditation bodies, regulatory and quality assurance agencies is highly required that could support developing framework that can assist HEIs to govern such advancement.

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