A Systematic Rapid Review of Empirical Research on Students’ Use of ChatGPT in Higher Education

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ABSTRACT
Chat Generative Pre-Trained Transformer (ChatGPT), introduced in November 2022, has evolved into a widely used open-access tool across various domains including higher education. While providing students with opportunities to independently create and access educational content, concerns have emerged regarding the potential for ChatGPT to cast students as passive recipients of pre-packaged knowledge, potentially impeding critical thinking and creativity in their learning process. As higher education institutions increasingly incorporate ChatGPT, there is a growing need for a thorough examination of its impact on student learning through empirical research. The aim of this systematic rapid review is to synthesize empirical research evidence on students’ use of ChatGPT in higher education, emphasizing pedagogical possibilities and addressing emerging threats and challenges. A comprehensive literature search of relevant peer-reviewed articles in three databases was carried out in October 2023. A total of eight studies were identified, revealing a distribution of quantitative and qualitative research designs which included questionnaires, case studies, interviews, and tests as the primary research methods. Four overarching themes emerged from the analysis: (1) Promoting students’ learning and skills development; (2) Providing content and immediate feedback; (3) Activating motivation and engagement; and (4) Dealing with ethical aspects of ChatGPT’s use. While our findings suggest that ChatGPT can, on the one hand, enhance the learning process, it can also inhibit it in various ways. Therefore, it is important to guide students in learning to use it responsibly and ethically as well as reflecting on the long-term effects of its use on their identity and the overall quality of their learning. The implications of this systematic rapid review are also discussed.

Keywords: systematic rapid review; ChatGPT; higher education; students’ use

1. Introduction
Chat Generative Pre-Trained Transformer (ChatGPT) was introduced in November 2022 and started to be used publicly as an open access tool in almost all walks of life, including higher education. It offers several educational opportunities for students to access and self-create content to use in their learning processes. However, it also
poses threats by positioning students as mere receivers of prepackaged knowledge without engaging them in the thinking and creative process as part of their learning. Such a rapid trajectory change in the way students engage in their own learning is to be considered a major shift in higher education. Since its introduction, higher education institutions increasingly argue, assess, and integrate ChatGPT to varying degrees. This requires a critical examination and synthesis of existing empirical research as to how it could be used by students in higher education and its impact on their learning, which need to be comprehensively understood despite its recent launch (Neumann et al., 2023; Rasul et al., 2023). Hence, in this review, we aim to synthesize evidence in empirical research on the use of ChatGPT and to identify pedagogical possibilities related to the use of ChatGPT in higher education, also with an emphasis on emerging threats and challenges. With an attempt to introduce practical insights into the impact dimensions of the use of ChatGPT by higher education students, we argue that this systematic rapid review could have implications for higher education decision- and policymakers.

While the use of ChatGPT is a relatively new practice, research into this topic is an emerging area for researchers. Several studies have been published already, due to its substantial use across the world and in every domain of life, including higher education institutions by teachers, students, and administrators. In our systematic rapid review, we examine the impact dimensions on students’ use mainly because of the increasing concerns about how they use it, such as its ethical use, academic integrity, and how this might influence their learning (Cotton et al., 2024; Sullivan et al., 2023). Initial studies have also explored the potential benefits of ChatGPT in language learning within higher education contexts (see Baskara, 2023; Cai et al., 2023; Hong, 2023). Educational technologies driven by artificial intelligence (AI) are progressively being used to automate and provide support for various learning activities (Cavalcanti et al., 2021; Deeva et al., 2021). Even though recent research has focused on the impact of ChatGPT, identifying challenges and opportunities in learning, it has not examined this within the higher education sector (see Lo, 2023; Montenegro-Rueda et al., 2023).

ChatGPT has the capacity to support teachers and students in diverse ways; however, significant concerns emerge regarding its integration, unpredictable behaviors, and the need for responsible use (Alqahtani et al., 2023; Bozkurt, 2023). Concerns have also been raised as to how ethical it is for students to use ChatGPT when submitting assignments for assessment and grading for course completion. Similarly, there are concerns about the diminishing necessity for students to actively conduct processes such as writing, problem-solving, foster creativity, and generate original content independently (Fiialka et al., 2023). The use of AI-driven educational technology is also reported to contradict theories underlying self-regulated learning (Winne, 2013), in that the use of the tool minimizes opportunities for students to actively shape and reshape their learning experiences (Inouye et al., 2023), control their actions, make well-informed decisions, and navigate intricate social environments (Code, 2020).
These concerns and benefits create different perspectives, where some argue for its free use and suggest that teachers need to create more critical assigned tasks that require personalized and contextualized examples and justifications which may not be generated directly by ChatGPT, while others argue against its use altogether or support its conditional use by students (e.g., Tlili et al., 2023). Also, many higher education institutions have started to apply restrictions to or ban ChatGPT’s use by students in their updated policy documents. In addition, a review of news articles on how ChatGPT use can disrupt students’ learning and teaching in universities also revealed that the sentiment in the media is focused more on a negative discourse than a positive one, hence highlighting the public discussions and university responses on such controversies about academic integrity (Sullivan et al., 2023). There are also those who believe we need to add new components to the process of assessment, including oral exams where students demonstrate their verbal ability to present the assignment that they have produced (Rudolph et al., 2023).

In sum, there are several issues that have emerged in the first year of the use of ChatGPT, as reported and discussed in published research. However, despite the increasing body of research on ChatGPT in higher education, there is no systematic review that provides a comprehensive overview of what research has found. Therefore, it is timely to present a consolidated overview of the impact dimensions of the ChatGPT’s use and the potential implications for higher education. More specifically, in this rapid review, we sought answers to the following research questions:

- **RQ 1:** What are the defining characteristics of empirical research on students’ use of ChatGPT in higher education?
- **RQ 2:** What pedagogical possibilities and insights can we gain from students’ use of ChatGPT in the context of higher education?

### 2. Method

With the aim of identifying the empirical studies on students’ use of ChatGPT in higher education, we conducted a systematic rapid review. When conducting this review, we used an explicit and replicable search strategy, with predefined inclusion and exclusion criteria (Gough & Thomas, 2016) which followed the Preferred Reporting Items for Systematic Reviews and Meta Analyses’ (PRISMA) reporting guidelines (Page et al., 2022). The PRISMA guidelines were formulated to enhance the transparency and accuracy of reporting in systematic rapid reviews.

The steps recommended by van Wesel et al. (2015) were followed in this systematic rapid review: (a) literature search, (b) study identification, (c) data extraction/study coding, (d) study quality appraisal, and (e) thematic analysis.

#### 2.1 Literature search

In line with the research questions mentioned above, we developed the following search string: “chat generative pre-trained transform*” OR gpt* AND “higher
education*” OR universit* OR college*. The searches were conducted by the first and second authors to ensure the quality of the searches in the databases. Using this search string, we conducted the searches on title and abstract on November 10, 2023, in three databases: ERIC, Scopus, and Web of Science, due to their coverage of educational studies as well as having been indexed by numerous journals. We added additional filters in line with our inclusion/exclusion criteria. Search strings for each database are provided in Appendix A.

2.2 Identification of eligible studies
Prior to the searches, we set the inclusion and exclusion criteria a priori to guide the screening process (see Table 1). Since our review aimed to explore the students’ use of ChatGPT, we excluded papers that dealt with other aspects, such as testing ChatGPT’s performance or the comparison of teacher and ChatGPT feedback and assessment results.

After the searches were completed, all results were uploaded to EPPI-Reviewer Web via an RIS file. EPPI-Reviewer is an application for all types of systematic reviews that allows for transparent screening and coding. After removing duplicates, the screening process was carried out in two stages. First, the first and second authors screened each title and abstract by discussing these together. In cases of disagreement, detailed discussions were carried out until reaching a consensus. Subsequently, in the second stage, the full texts were screened by the first and second authors in the same way.

<table>
<thead>
<tr>
<th>Eligibility criteria</th>
<th>Include</th>
<th>Exclude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publication year</td>
<td>Articles from November 30, 2022</td>
<td>Studies published before ChatGPT was launched</td>
</tr>
<tr>
<td>Topic</td>
<td>Students’ use of ChatGPT</td>
<td>No focus on students’ use of ChatGPT</td>
</tr>
<tr>
<td>Target group</td>
<td>Higher education</td>
<td>Not higher education</td>
</tr>
<tr>
<td>Study type</td>
<td>Empirical study</td>
<td>Theoretical and conceptual papers</td>
</tr>
<tr>
<td>Publication type</td>
<td>Peer reviewed articles</td>
<td>Grey literature, protocols, editorials, theses, conference papers</td>
</tr>
<tr>
<td>Publication language</td>
<td>In English</td>
<td>Not in English</td>
</tr>
</tbody>
</table>

2.3 Data extraction
The second author extracted and entered information about each study into the EPPI-Reviewer software (Thomas et al., 2020) to identify study characteristics (such as country, research question, study design, research method, study informants, field of study, and study purpose). Additionally, findings from the included studies were extracted to identify common themes. Subsequently, the third author reviewed all the extracted data and updated it if necessary.
2.4 Data synthesis
To synthesize the data and derive themes, we employed thematic analysis as outlined by Braun and Clarke (2006, 2019). A three-person analysis team conducted a step-wise analysis and synthesis of the data. Data extraction was followed by thorough readings of all articles by all co-authors for familiarization. Subsequently, the first and second authors initially coded the extracted data inductively. Meetings among co-authors were held to discuss, generate, and refine themes. To enhance rigor, the third author played a crucial role in challenging the assumptions and potential biases of the first and second authors in theme generation and elaborated on the themes.

2.5 Study quality
To assess the study quality, each included article was assessed using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018) in EPPI-Reviewer. This tool includes two screening questions and a further five questions to assess the methodological quality of various study types: quantitative (randomized control trial, non-randomized, and descriptive), qualitative, and mixed-method studies (see Appendix B). Each item is rated as “yes,” “no,” or “cannot tell.” The second and third authors rated each study independently and went through any disagreements to finalize the assessment. Disagreements were minor and they were resolved by discussion. Table 2 provides an overview of this evaluation. There were no studies with quantitative (randomized control trial), quantitative (non-randomized), or mixed-method designs; hence, they were omitted from the MMAT’s checklist. Out of eight studies, two (25 per cent) did not fulfil the criterion of having two screening items (e.g., rated as “no” or “cannot tell”), and were not further evaluated. The scores for the three qualitative studies varied between 2 to 5, but two of these studies were rated as excellent (scoring 5). On the other hand, the three quantitative descriptive studies received scores of between 2 to 3 only.

3. Results
3.1 Study identification
A total of 502 potentially relevant articles from the three databases were identified: 6 from ERIC, 90 from Web of Science, and 406 from SCOPUS. After the removal of duplicates \((k = 81)\), the titles and abstracts of the remaining 421 studies were screened. A total of 375 articles were eliminated after the initial title and abstract review due to their inability to meet at least one of the inclusion criteria: excluded due to topic \((k = 370)\), target group \((k = 2)\), study type \((k = 1)\), and publication type \((k = 2)\).

The full texts of 46 studies were uploaded into EPPI-Reviewer and read in detail. Thirty-eight of them were excluded after a review of the full text. As a result, 8 studies were included in this systematic rapid review. Figure 1 shows the details of the search and study identification process.
Table 2. Study quality assessment

<table>
<thead>
<tr>
<th>Screening questions (for all types)</th>
<th>Boubker (2024)</th>
<th>Fialka et al. (2023)</th>
<th>Firat (2023)</th>
<th>Marzuki et al. (2023)</th>
<th>Pitso (2023)</th>
<th>Rajabi et al. (2023)</th>
<th>Tsai et al. (2023)</th>
<th>Walczak &amp; Cellary (2023)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1. Are there clear research questions?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>S2. Do the collected data allow for addressing the research questions?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Cannot tell</td>
<td>Yes</td>
<td>Cannot tell</td>
<td>Yes</td>
</tr>
<tr>
<td>1. Qualitative</td>
<td>1.1. Is the qualitative approach appropriate to answer the research question?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1.2. Are the qualitative data collection methods adequate to address the research question?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>1.3. Are the findings adequately derived from the data?</td>
<td>Cannot tell</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.4. Is the interpretation of results sufficiently substantiated by the data?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?</td>
<td>Cannot tell</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Quantitative descriptive</td>
<td>4.1. Is the sampling strategy relevant to address the research question?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.2. Is the sample representative of the target population?</td>
<td>No</td>
<td>Cannot tell</td>
<td>Cannot tell</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>4.3. Are the measurements appropriate?</td>
<td>Yes</td>
<td>Cannot tell</td>
<td>Cannot tell</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>4.4. Is the risk of nonresponse bias low?</td>
<td>Yes</td>
<td>Cannot tell</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.5. Is the statistical analysis appropriate to answer the research question?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
3.2 RQ1: Characteristics of the empirical studies
Table 3 displays the characteristics of the studies included. There was an equal distribution of quantitative (50 per cent) and qualitative (50 per cent) research designs in the included studies. The predominant research methods were surveys (50 per cent) and case studies (25 per cent), while the remaining studies used action research (12.5 per cent) and focus groups (12.5 per cent). Data collection primarily relied on questionnaires (50 per cent), while interviews (25 per cent) and tests (25 per cent) were used less frequently.

Most studies drew on information provided by students (45 per cent), followed by information from teachers (27 per cent). Information from PhD students (9 per cent),
<table>
<thead>
<tr>
<th>Author</th>
<th>Research questions</th>
<th>Country</th>
<th>Design</th>
<th>Research method</th>
<th>Sample</th>
<th>Field of study</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boubker (2024)</td>
<td>How do the drivers of ChatGPT use and students’ satisfaction influence perceived usefulness, learning outcomes, and the enhancement of learning outcomes?</td>
<td>Morocco</td>
<td>Quantitative</td>
<td>Survey</td>
<td>Students ($n = 319$)</td>
<td>Multiple fields such as nursing, logistics, computer science, entrepreneurship.</td>
<td>To examine the role of ChatGPT in enhancing students’ learning outcomes.</td>
</tr>
<tr>
<td>Fiialka et al. (2023)</td>
<td>How does the experience of using ChatGPT in the educational process impact learning quality, effectiveness of material acquisition, and user satisfaction, considering potential limitations, variations across educational settings, subjects, and teaching methodologies?</td>
<td>Ukraine</td>
<td>Quantitative</td>
<td>Survey</td>
<td>Teachers ($n = 622$), educational and pedagogical practitioners ($n = 413$)</td>
<td>Education</td>
<td>To look at aspects of using ChatGPT in education.</td>
</tr>
<tr>
<td>Firat (2023)</td>
<td>To examine the potential benefits of AI in education as well as the challenges and barriers.</td>
<td>Multicountry: Türkiye, Sweden, Canada, and Australia</td>
<td>Qualitative</td>
<td>Survey</td>
<td>PhD students ($n = 14$) and teachers ($n = 7$)</td>
<td>Social sciences</td>
<td>To explore the perspectives of students and educators on the implications of using ChatGPT.</td>
</tr>
<tr>
<td>Marzuki et al. (2023)</td>
<td>How do EFL teachers utilize AI writing tools to enhance students’ writing quality, with a specific focus on content and organization, and what are their perceptions regarding the impact of these tools on students’ writing in these aspects?</td>
<td>Indonesia</td>
<td>Qualitative</td>
<td>Case study</td>
<td>Teachers ($n = 4$)</td>
<td>Language</td>
<td>To examine the variety of AI (including ChatGPT) writing tools and their impact on student writing.</td>
</tr>
<tr>
<td>Author</td>
<td>Research questions</td>
<td>Country</td>
<td>Design</td>
<td>Research method</td>
<td>Sample</td>
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</tr>
<tr>
<td>Pitso (2023)</td>
<td>To test the efficacy of ChatGPT in educational settings, particularly regarding developing students’ innovative solutions.</td>
<td>South Africa</td>
<td>Qualitative</td>
<td>Action research</td>
<td>Students ($n = 15$) Engineering, Accounting, and Logistics.</td>
<td>Engineering, Accounting, and Logistics.</td>
<td>To focus on the impact of ChatGPT on students’ learning.</td>
</tr>
<tr>
<td>Rajabi et al. (2023)</td>
<td>How should ChatGPT be integrated into future courses and assignments according to students and faculty, considering factors such as the balance between in-class and take-home assignments, assessment methods, and its impact on students’ learning outcomes and job preparedness?</td>
<td>Canada</td>
<td>Qualitative</td>
<td>Focus group</td>
<td>Students (both graduate and undergraduate, $n = 34$), faculty members ($n = 6$) Applied sciences such as Engineering, Computer science.</td>
<td>Applied sciences such as Engineering, Computer science.</td>
<td>To examine stakeholders' views about ChatGPT's potential in higher education.</td>
</tr>
<tr>
<td>Tsai et al. (2023)</td>
<td>To explore the possibility of building virtual models for chemical engineering problems using ChatGPT.</td>
<td>Taiwan</td>
<td>Quantitative</td>
<td>Case study</td>
<td>Students (both graduate and undergraduate, $n = 29$) ChatGPT</td>
<td>Engineering</td>
<td>To produce a guide to facilitate the adoption of Large Language Model in ChatGPT.</td>
</tr>
<tr>
<td>Walczak and Cellary (2023)</td>
<td>To explore the advantages and potential threats of using Generative AI in education and necessary changes in curricula.</td>
<td>Poland</td>
<td>Quantitative</td>
<td>Survey</td>
<td>Students (both graduate and undergraduate, $n = 143$)</td>
<td>Multiple fields such as Computer science, Management, and Business psychology.</td>
<td>To examine students' perspectives and potential use of ChatGPT.</td>
</tr>
</tbody>
</table>
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faculty members (9 per cent), and ChatGPT (9 per cent) was reported in a few studies. The most studied disciplines in higher education were engineering (19 per cent), computer science (19 per cent), and logistics (13 per cent). Other disciplines that were addressed included education, social sciences, languages, nursing, entrepreneurship, accounting, business, and management, each accounting for 6 per cent of the included studies.

Various countries were covered in the included studies: Morocco, Ukraine, Indonesia, South Africa, Canada, Taiwan, and Poland. Only one of the studies had a multicultural focus, based in Türkiye, Sweden, Canada, and Australia.

3.3 RQ2: Pedagogical outcomes of students’ use of ChatGPT

Our analysis yielded four themes across the included studies (see Table 4): (1) Promoting students’ learning and skills development; (2) Providing content and immediate feedback; (3) Activating motivation and engagement; and (4) Dealing with ethical aspects of ChatGPT’s use.

Table 4. Four main themes across the included studies

| Theme 1: Promoting students’ learning | Boubker, 2024; Fiialka et al., 2023; Firat, 2023; Marzuki et al., 2023; Pitso, 2023; Rajabi et al., 2023; Tsai et al., 2023 |
| Theme 2: Providing content and immediate feedback | Fiialka et al., 2023; Marzuki et al., 2023; Rajabi et al., 2023; Tsai et al., 2023 |
| Theme 3: Activating motivation and engagement | Boubker, 2024; Fiialka et al., 2023; Pitso, 2023; Walczak & Cellary, 2023 |
| Theme 4: Dealing with ethical aspects of ChatGPT’s use. | Fiialka et al., 2023; Firat, 2023; Rajabi et al., 2023 |

3.3.1 Promoting students’ learning and skills development

An important theme across the included studies was the importance of students’ ChatGPT use for their learning and development of various skills, such as writing skills and problem-solving skills. For example, Marzuki et al. (2023) suggest that ChatGPT “carries the ideas, thoughts, and messages that the writer wants to convey. It is the ‘what’ of the writing—the substance” which “can be an excellent tool for students to experiment with different writing styles and ideas.” Marzuki et al. (2023) hence argue that “ChatGPT stimulates conversations with students, thereby enhancing their conversational writing skills.” Despite the cognition-nurturing benefits, the authors emphasize that AI tools including ChatGPT might unfortunately “generate ideas, potentially curtailing their creative thinking and originality.” While this might be a good angle to claim since students might be finding many ideas readily produced by the tool without their active and creative thinking, it could also reflect that they learn to develop ideas and generate diverse perspectives especially the next time they start thinking and generating ideas. In the long run, they can independently do so without over-relying on the tool. While students use the written content generated by ChatGPT, they are still affected positively by the resulting engagement in
content creation, assessment, and revision that they are most likely to do when they use ChatGPT as a collaborative writing assistant. For instance, as Marzuki et al. (2023) argue, teacher participants also highlighted that AI writing tools influenced “students’ vocabulary use and growth,” but also created negative influences due in part to the diverse backgrounds of teachers.

Tsai et al. (2023) note positive effects on students and argue that through ChatGPT-assisted Large Learning Models (LLMs), “students can engage in interactive problem-solving activities that enhance their understanding of course concepts.” The authors also suggest that “by carefully going through the solutions generated by LLMs, students develop a deeper level of mastery and can identify potential errors in the solution.” Such cognitive engagement processes support their problem-solving skills and enhance their ability to think reflectively and critically (Tsai et al., 2023).

Firat (2023) argues that ChatGPT promotes the process of personalized learning as students use it, thereby adopting a practice of self-directed learning which “will become a lot easier.” The author exemplifies with reference to one of the participants that ChatGPT “can improve student performance and knowledge retention, which supports the theme of personalized learning,” and that “students can more easily adapt their learning to their present level of understanding – and without being shy about a machine.” Similarly, Pitso (2023) also found that the agency of students is supported when they use ChatGPT, noting that “Students were easing into working together without supervision and gaining greater control over their own learning.”

Iskender (2023) argues that “ChatGPT may assist in personal learning.” Hence, research provides suggestive evidence that personal learning skills are nurtured using ChatGPT. On the other hand, Iskender (2023, p. 8) also points out that critical thinking and creativity might be impeded due to over-reliance.

While some studies support the idea that the process of learning can be engaging with the use of ChatGPT, Rajabi et al. (2023) argue with reference to one of the participants that “some students will probably blindly [use] ChatGPT’s answers and this could reduce their learning progress” and [one of their participants] raised a similar concern that “[ChatGPT] may take away from the learning process.” To support students and develop their learning process, Rajabi et al. (2023) suggest “adding more synchronous elements such as in-class assignments and quizzes,” which “may regulate ChatGPT usage, encourage student attendance and engagement.” Moore et al. (2022) also highlight that using ChatGPT “keeps students more engaged in the learning process” in their study that assessed the quality of student-generated short answer questions using GPT-3. More specifically, Marzuki et al. (2023) specify that “they enhance their skills to develop students’ technical skills, problem-solving skills, critical thinking skills, communication skills, etc., as part of the program learning outcomes.” However, Pitso (2023) points to the participating students who developed an “increasing realization that hard-coded knowledge even from chat-GPT was inadequate and new ideas would have to be generated if the problem was to be solved.” This shows that students assessed the accuracy of the content that ChatGPT originally created and, while doing
so, they challenged their own thinking process to further prompt ChatGPT to provide accurate and relevant ideas through sustained iterative brainstorming and active question and answer loops. This is further evident in the author’s own words: “Students then prompted chat-GPT for some innovative solutions to the problem” (Pitso, 2023).

Fiialka et al. (2023) also report that among 1,035 informants, of whom approximately 413 came from higher education institutions, the use of ChatGPT was found to contribute to the development of students’ critical thinking (38.2 per cent) and creative thinking skills (37.2 per cent), while to a lesser degree the study reports that its use by students can help them develop the ability to solve complex problems (16.4 per cent) and increase the success of students (12.7 per cent). In the same research, on the other hand, there were negative reports from respondents regarding the students’ learning and skills development. For example, they emphasized the potential “loss of creativity skills” (30.7 per cent) and minimized “independence” when collaborating with ChatGPT technology (60.5 per cent). However, these results reflect the attitudes of teachers and pedagogical practitioners from higher education, primary and secondary education levels. The authors specifically reported that higher education participants had a more positive attitude towards students’ use of ChatGPT.

In line with the findings reported above, Firat (2023) highlights the role of digital literacy in “learning how to interact effectively and critically evaluate AI-generated content,” adding that “AI will significantly impact traditional learning methods, shifting the focus on skills and competencies.” It is obvious that the author implies irreversible change in the way learning starts to occur, and the learning skills students need to develop to make use of ChatGPT have been transformed.

### 3.3.2 Providing content and feedback

Content generation is one of the key functions and purposes of ChatGPT use, which has long been conducted by humans in an identical manner. However, ChatGPT produces at an amazingly fast rate and generates potentially comprehensive text for users’ review and assessment. Fiialka et al. (2023) discuss some specific uses of ChatGPT in providing feedback and described this as its ability to “provide useful information.” The authors suggest that “AI-powered assessment systems have the potential to integrate continuous feedback into the learning process by utilizing unique and unconventional artifacts.” Citing Cotton et al. (2023), Rajabi et al. (2023) similarly note that the ability of ChatGPT “to provide personalized feedback and support for students can improve the quality of education and enhance the learning experience.” The students access response and feedback quickly (Fiialka et al. 2023).

The role of ChatGPT in students’ thinking and question-posing processes through assistance and support by ChatGPT is also highlighted in other studies. For example, Moore et al. (2022) emphasize that “Students can generate high quality questions with minimal scaffolding,” reiterating the idea that “students can generate short answer questions that are both linguistically and pedagogically sound without requiring an external tool or scaffolding.” ChatGPT appears to be used for many
different functions and roles, including acting like a teacher who provides feedback and support that facilitates student learning. Marzuki et al. (2023) report students’ views on “how the tools offered real-time prompts that helped students incorporate transitional elements while their thoughts were still fresh, contributing to improved organization and clarity,” emphasizing “the capacity of AI writing tools to promote active and timely learning.” In regard to the practice of providing feedback on writing, Marzuki et al. (2023) argue that:

Writing tools can provide instantaneous feedback and suggestions for reorganizing sentences and paragraphs, thus helping students improve the structure of their writing. The instant feedback they provide allows students to correct and learn from their mistakes in real-time, thereby reinforcing their understanding of good writing practices.

This is also reiterated by Rajabi et al. (2023), who argue that “ChatGPT could be used for marking assignments and exams to both expedite the process and provide more detailed feedback to the learners.” Marzuki et al. (2023), on the other hand, highlight the role of guide undertaken by ChatGPT when used by students, providing them with a virtual guide that gives content and feedback timely when students are engaged and potentially learning, and when they need to be scaffolded: “The tools facilitate a clear, logical flow of thoughts by suggesting better phrasing, removing redundancies, and enhancing coherence. Students tend to write more confidently knowing that the tool is there to guide them…” (Marzuki et al., 2023).

Pitso (2023) also underscores how students access feedback on their assignments: “Students were exposed to chat-GPT and this stage involved testing it out on their assignment samples.” On another note, Tsai et al. (2023) discuss the feedback provided by the tool by noting:

This feedback can provide insight into students’ challenges and how they find these tools helpful. Such feedback is essential for educators and students to understand the potential and limitations of the model, ultimately enhancing the teaching and learning experience.

Hence, Tsai et al. (2023) seem to be emphasizing the key role of the use of feedback generated by ChatGPT in the learning process, as many other authors do.

3.3.3 Activating motivation and engagement

Analyzing the assignment samples of students exposed to ChatGPT, Pitso (2023) highlights the positive impact of ChatGPT on students’ motivation and collaboration:

Chat-GPT is easy to prompt for advanced undergraduates given that their technology use in learning improved during the pandemic plus it lessens the time of doing assignments quite significantly. The ease of technology use has proved valuable in increasing students’ motivational levels and students’ collaboration provided the necessary peer emotional support …
Similarly, Walczak and Cellary (2023) found that 88 per cent of the participants mentioned ChatGPT use as a source of motivation triggered by curiosity. While there is a need for more evidence that ChatGPT could be a motivational and engaging source, the emerging positive findings and views could be a sign of how it is perceived by students. On the other hand, completing and submitting assignments can often be very daunting, leading to greater stress levels and degrees of anxiety due partly to the lack of access to immediate feedback and resources that can help in the process of preparing. ChatGPT is found to minimize potential affective barriers. For example, Fiialka et al. (2023) argue that the regular use of ChatGPT might reduce the “level of stress and anxiety” among students. This could be related to increased student satisfaction with the use of ChatGPT (Boubker, 2024).

In the quantitative study by Boubker (2024), motivational aspects were found in numerous ways with the constructs of perceived usefulness and satisfaction of using ChatGPT. For example, they found that “the more high-quality output ChatGPT produces, the more students perceive its usefulness and tend to be interested in using it.” They further found that “a positive perception of ChatGPT’s usefulness is likely to encourage more usage and increase satisfaction,” which shows how students can be motivated to learn during their use of ChatGPT. The author also highlights the role of those who are important to students, pointing out that teachers “can enhance the perceived usefulness of AI tools and encourage students to use ChatGPT.” Overall, this study argues that “Perceived usefulness and student satisfaction enhance individual impact on their learning” (Boubker, 2024).

3.3.4 Dealing with ethical aspects of students’ use of ChatGPT

When ChatGPT was made accessible to students, one of the key concerns was to ensure its fair and unbiased use. Some ethical concerns include the breach of privacy and confidentiality which ChatGPT might cause. In Fiialka et al. (2023), for example, 14.9 per cent of the informants reported problems with such potential breaches. This could especially be related to the increased percentage of students (51.8 per cent) using ChatGPT to cheat during tests and other monitoring measures. However, the assumption here is that students are still not mature enough to distinguish truth from fiction (53.5 per cent), which leads to an increase in the number of errors they make (Fiialka et al., 2023).

In Rajabi et al. (2023), intriguing questions were also raised by the participating students regarding the lack of guidelines from the university and instructors on what would constitute misuse of ChatGPT. For example, one of the participants asked the following two questions highlighting what counts as cheating and what does not: “What if I expand my idea on ChatGPT? Is that cheating? How can students cite content generated by ChatGPT?” Rajabi et al. (2023) further argue that there is a need for clear guidelines regarding academic honesty, a perspective also underscored by Firat (2023) in relation to the role of ethical and social considerations in education incorporating ChatGPT. However, ChatGPT can enhance the accessibility of students with diverse needs to the system and minimize factors that exacerbate
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educational inequalities, leading to greater equity. For example, Fiialka et al. (2023) draw our attention to how ChatGPT can be used to “empower learners with disabilities by providing inclusive learning strategies.” This includes the generation of content for special needs students in cases of inaccessibility of classrooms, finding broader opportunities to enhance the content of the course, and using ChatGPT in the absence of teachers to access feedback on their learning and performance.

4. Discussion

The aim of this systematic rapid review was to synthesize empirical research evidence on students’ use of ChatGPT in higher education directly after its launch, emphasizing pedagogical possibilities and addressing emerging threats and challenges. Based on a comprehensive literature search of relevant peer-reviewed articles in three databases, a total of eight studies were identified, representing various countries and revealing an even distribution of quantitative and qualitative research designs. Four overarching themes emerged from the synthesis of the findings: (1) Promoting students’ learning and skills development; (2) Providing content and immediate feedback; (3) Activating motivation and engagement; and (4) Dealing with ethical aspects of ChatGPT’s use.

As highlighted by Wass and Golding (2014), the zone of proximal development (ZPD), which represents the theoretical boundary where students are unable to learn independently, necessitating assistance from someone knowledgeable (Vygotsky, 1987), can be used as an effective teaching tool, where teachers assign tasks of a complexity beyond students’ individual capabilities but which can be accomplished with scaffolding. While this study discusses the role of teachers in being present at such a level of student performance, the results in our review show that ChatGPT might function as an effective tool to provide timely scaffolding by offering precisely enough assistance to empower students to eventually complete their tasks autonomously. ChatGPT appears to be an emerging tool to challenge students to go beyond their typical capacity while engaged in such tasks. We argue that the thematically synthesized findings reflect a process of how students could gain access to expert support within the ZPD. In practical terms, students facing learning and motivational challenges may not readily access or benefit from feedback or guidance from peers or teachers. However, the utilization of ChatGPT serves as a “scaffold” provider in such instances, facilitating the learning process precisely when it is most needed by the students. Although this function looks straightforward, its direct implementation may not be immediate. This is because students might need to acquire the skill of using ChatGPT not solely for content generation, but also for the validation of their own ideas, solutions, or arguments. Scaffolding is most effective when students attain a foundational understanding independently, after which they receive support from knowledgeable individuals. Therefore, students should recognize when they have reached a certain level and require scaffolding, challenging them to actively seek assistance, explanations, verification, or suggestions.
From this theoretical perspective, numerous benefits emerge in terms of changes in learning paradigms, students’ roles, engagement patterns, and approaches to learning. These transformative changes increasingly position students as co-constructors, actively engaging in collaborative knowledge construction with AI as if they were collaborating with their peers or teachers (see Liu et al., 2023). The synthesized studies in the article highlight a shift in the process, engagement, and motivation for self-regulated learning. This involves acquiring the skills to prompt ChatGPT correctly, interpreting the accuracy, validity, and relevance of the generated content, and actively comparing and contrasting the information sought to discover the subtle details and differences in ideas and arguments. To foster the development of such students, Álvarez-Álvarez and Falcon (2023) propose that the integration of ChatGPT could trigger a methodological shift in teaching practices, potentially enhancing student interest, engagement, and performance. Rather than providing direct input to students, teachers will need to assume new roles that involve facilitating collaborative interactions between students and ChatGPT, as well as similar AI tools, to optimize their learning and understanding. The integration of ChatGPT and similar AI tools into education brings about a paradigm shift in the role of teachers and, consequently, necessitates adjustments in teacher education. These roles might include acting as facilitators of AI collaboration, guides for critical thinking, adaptive course designers, and experts in generating functional prompts.

The reviewed studies consistently highlight the positive impact of using ChatGPT on students’ learning and skills development (Chaudhry et al., 2023). Marzuki et al. (2023) emphasize the improvement of conversational writing skills, and Firat (2023) suggests that ChatGPT promotes personalized learning, facilitating self-directed learning. The agency of students is supported, as noted by Pitso (2023), with students gaining greater control over their own learning. Firat (2023) also highlights the positive impact of ChatGPT on personal learning skills with the evidence that students’ skills in areas such as vocabulary use, critical thinking, and problem-solving are nurtured through ChatGPT. All these redefine the students’ engagement process in learning specific skills related to their literacy development, and understanding how such development occurs within their own regulatory strategies can make students more agile, responsive, and aware of their own learning process. The use of ChatGPT will strengthen the adoption of their roles not as passive recipients of knowledge but as active, critical, and responsible individuals in the construction of their knowledge.

Similarly, Tsai et al. (2023) emphasize the positive effects on students, indicating that ChatGPT-assisted LLMs facilitate interactive problem-solving activities, leading to a deeper understanding of course concepts, thereby consistently activating students’ cognitive engagement processes by supporting problem-solving skills, reflective thinking, and critical thinking. Once students begin utilizing ChatGPT responsibly and ethically, they consistently question the accuracy and appropriateness of generated content and responses for validation. This process cultivates their skills in questioning and assessing the value of emerging ideas. Such competence is
often challenging to achieve in interactions with teachers, peers, and course content
due to limitations in human resources and capacity. ChatGPT, on the other hand,
has the potential to provide responses continuously, addressing students’ inquiries
and facilitating skills development without the constraints imposed by finite human
resources. Therefore, ChatGPT’s role in providing feedback on students’ ideas, argu-
ments, and solutions is crucial, as discussed in numerous studies (see Chaudhry
et al., 2023; Crawford et al., 2023; Nikolic et al., 2023). Nikolic et al. (2023), for
example, emphasize the significance of ChatGPT in providing feedback and offering
learning-oriented support, similar to the approach of an ideal teacher in a typical
learning environment, arguing that the potential impact of ChatGPT on the assess-
ment and feedback processes for engineering students is underscored although it
can potentially be used to provide instant feedback on assignments and assessments,
enabling students to promptly spot areas for improvement.

Marzuki et al. (2023) and Rajabi et al. (2023), for example, highlight its ability to
offer instantaneous feedback, helping students to improve their writing structure and
learn from mistakes in real-time. In a similar vein, Chaudhry et al. (2023) highlight
the function of ChatGPT in providing feedback, describing it as offering real-time
feedback on students’ work, providing an opportunity for improvement through per-
sonalized support. This prompt and personalized feedback mechanism not only aids
in immediate improvements but also facilitates students in recognizing the practical
applications of what they are learning, bridging the gap between theoretical knowl-
edge and real-world scenarios (Chaudhry et al., 2023).

The feedback generated by ChatGPT is considered valuable for teachers and stu-
dents, contributing to understanding potential challenges, enhancing the teaching
and learning experience. Crawford et al. (2023) contend that receiving feedback
from ChatGPT can assist students in recognizing overlooked areas, offering subtle
guidance on further reading, and nurturing a sense of connection, albeit a human-
robot connection, to complement existing peer and teacher connections. ChatGPT
is identified as a source of motivation for students, easing the assignment process and
providing emotional support (Pitso, 2023; Walczak & Cellary, 2023). It also helps
them reduce stress and anxiety, potentially enhancing student satisfaction and per-
ceived usefulness.

Concerning the learning process facilitated by ChatGPT, several challenges have
led to critical assessment of the positive and negative impacts on the students’ learn-
ing process. Perceived threats include potential negative effects on ethical consid-
erations, such as concerns about plagiarism and the unauthorized ownership of
information. The studies highlighted various pitfalls that could hinder the learning
journey, including the risk of students falsely claiming ownership of their work or
knowledge creation without investing the expected time and effort in genuine knowl-
edge production or in assignment completion. Similarly, some studies highlighted the
potential loss of creativity and independence, as well as the potential of ChatGPT
to diminish opportunities for students to exercise creativity and critical thinking
(Fiialka et al., 2023). Criticisms also include claims that ChatGPT may oversimplify tasks or the work to be produced, potentially limiting creativity and critical thinking, which necessitates continuous and intentional training of students on how to utilize ChatGPT responsibly and ethically to initiate, deepen, and improve learning with its ubiquitous accessibility to personalized support. While ChatGPT can simplify certain tasks, it is essential for teachers to ensure that its use complements, rather than replaces, students’ creative and independent thinking skills without losing the richness of independent thought and creative expression.

Some studies, like Rajabi et al. (2023), express concerns about potential drawbacks, including the possibility of students blindly relying on ChatGPT, potentially decelerating their actual learning progress, which is also underscored by Liu et al. (2023). To address this, suggestions include adding synchronous elements to regulate ChatGPT use and encouraging student engagement to contextualize, personalize, and adapt ChatGPT-generated responses and content to enhance their learning process and outcomes. Among other threats that are likely to be addressed in the future incorporation of ChatGPT include ethical concerns raised regarding lack of integrity, potential misuse, including privacy breaches, and cheating during tests (Liu et al., 2023). The need for clear guidelines on academic honesty is emphasized, with students expressing uncertainty about the boundaries of using ChatGPT so they can learn to address ethical concerns through responsible and transparent use. Institutions ought to take a proactive stance in educating both teachers and students on the ethical implications, thereby establishing a culture of responsibility in knowledge production and supporting learning outcomes. This mindset can contribute to long-term, deep learning by nurturing the mind, prioritizing cognitive development over merely creating products or assignments that may lack a substantial impact on individual cognitive growth.

4.1 Limitations
Several limitations should be considered when interpreting the findings of this systematic rapid review. First, our review covered a small number of studies with varied designs and contexts. However, considering ChatGPT as a relatively new but substantially used practice, the synthesis of research into it as an emerging area for researchers is important, also for guiding future research. Even though the eight studies originated from various countries, only studies published in English were included. Hence, this limits the generalizability of the review findings. We only included empirical studies in peer-reviewed journals, excluding grey literature since we also used a rapid review methodology. Hence, the scope was also limited, due to the fact that ChatGPT is a relatively new and emerging topic in higher education. As the field continues to evolve rapidly, future reviews may include additional sources such as grey literature to capture emerging trends and developments. Furthermore, our search was limited to three databases, hence future studies should expand their search to include more databases to identify relevant research on students’ use of
ChatGPT in higher education. We also evaluated the quality of the included studies as a part of this systematic rapid review and, while the quality of some of the studies was questionable, for some others the quality assessment was not feasible since they did not meet the screening criteria. Hence, this should be considered while interpreting our results, as some results may be less valid and reliable than others due to their quality and study designs.

4.2 Implications

Studies suggest that ChatGPT can enhance the learning process. However, higher education institutions must implement certain practices to ensure the quality of its use by students. It is crucial to introduce students to ChatGPT through proper training, focusing on its potential for learning and addressing ethical issues that they may not be aware of while using it. Crawford et al. (2023) suggest the use of “AI like ChatGPT to build supportive learning environments for students who have cultivated good character,” and add that ChatGPT could be taught in subjects and courses where “we might be able to teach students ethical use of such devices.”

While integrating ChatGPT into the learning process may seem straightforward, it is important to guide students in reflecting on the long-term effects of its use on their identity and the overall quality of their learning. True learning goes beyond grades; it involves a deeper learning process that deserves substantiation. There is a risk of fake learning, and empowering students to recognize and address such instances is essential.

We recommend that higher education institutions establish clear guidelines outlining their policies on the use of ChatGPT. This can be further supported by conducting workshops to raise awareness, offering group support opportunities, and encouraging students to transparently use ChatGPT for genuine credit. Crawford et al. (2023) advocate for ethical ChatGPT use as a supplementary tool that supports the process of learning “not by adopting a fear-based ban response but by encouraging students to use it just like they use other similar software tools.” In this way, higher education institutions can contribute to a more responsible and ethical integration of this tool into the learning process.

We also advocate for a redefinition of assessment policies and practices in higher education institutions. This involves enhancing teachers’ awareness of potential misperceptions and malpractices related to assessing students’ performance. The assessment of student work should be designed to incorporate multiple points of evaluation throughout the course, promoting continuous assessment of learning. Moreover, it is crucial to design assessment tasks that align with the process of assessment for learning (Rudolph et al., 2023), where assessments are carried out to facilitate the students’ engagement in a deep and meaningful learning experience rather than merely demonstrating what they have learned during the course.

Given that ChatGPT has become an integral part of educational contexts, it is time to devise training programs for both students and teachers to enhance their
awareness of responsible and ethical use. This can be accomplished by adopting digital literacy perspectives, which involve the informed and thoughtful use and integration of digital tools, ensuring that students are well-versed in the pedagogical potential and relevant applications of digital tools like ChatGPT.

5. Conclusion

Our review has the potential to offer comprehensive insights into the empirical research on ChatGPT in higher education, emphasizing both its benefits and challenges. As a new tool that may both enhance and inhibit the learning process of students, teachers and students should be cautious and critical of its role, not only in the learning process but also in the assessment process. Furthermore, we advocate for clear guidelines, policies, workshops, and group support opportunities to ensure responsible integration into the learning process.

Author contributions

Author 1 and Author 2 contributed equally to the conceptualization and design of the study. Author 1 drafted the introduction, results, and discussion sections in the initial manuscript. Author 2 drafted the method section in the initial manuscript. Author 3 contributed to data analysis, data interpretation, and writing. All authors critically reviewed and approved the final version. All authors have agreed to be accountable for all aspects of the work, ensuring its accuracy and integrity in accordance with the Contributor Roles Taxonomy.

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