



A Systematically Informed Conceptual Review of the Effect That Generative AI Has on University Students' Reported Self-Efficacy

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Abstract

The consistent growth in the use of Generative artificial intelligence (AI) globally has led to an increased focus on attempts to measure the impact that it has on university students, including their academic motivation and ability. An emerging interest in the literature addresses the impact that the use of Generative AI may have on students' reported *self-efficacy*—and specifically whether use of Generative AI is associated with an increase or decrease in reported self-efficacy. This systematically informed conceptual review draws on the theoretical construct of self-efficacy in analyzing papers published in 2025 and 2026. The results suggest an initial framework that identifies the factors that determine whether university students' use of Generative AI is likely to enhance or diminish their self-efficacy. The analysis presented here identifies the following factors as important determinants of the impact that Generative AI usage is likely to have on students' self-efficacy: *pedagogic support* (the extent to which the Generative AI is introduced with learning and teaching support); *task usefulness* (whether the Generative AI has the quality and relevance to address the specific focal task; and *unique affordances* (whether the Generative AI has qualities that make it uniquely valuable in addressing the task). Consistent with the Triple Helix framework, implications for governments, industry, and educators regarding the importance of self-efficacy in education policy, in AI resource development, and also in the pedagogic framework of its deployment with students are identified. Furthermore, the relevance of these findings for Sustainable Development Goal 4 (SDG 4) is also identified.

Keywords: Generative AI; AI; self-efficacy; educational AI; university students; review; conceptual review

Introduction

Generative AI usage across the world

The precise global percentage of students who use Generative artificial intelligence (AI) is difficult to definitively identify, due to regional variation and incomplete usage data, yet multiple global and national studies suggest a continuing growth in student usage. Chegg Inc.'s Global Student Survey [2025](#), drawing on data from 15 countries (representing Africa, Asia, Europe, North and South America, and Oceania), provides evidence that the increase in student usage of Generative AI can be considered a global trend.

The Digital Education Council (DEC) (2024, [2026a](#), [2026b](#)), drawing on data from 16 countries, provides a further sense of the extent of current global student usage of Generative AI, reporting 86% of students using Generative AI in 2024, with their 2026 Latin America follow-up reporting the “near universal usage figure” of 92%. Similarly, the Higher Education Policy Institute ([HEPI 2025](#), [2026](#)) report a UK student usage growing from 53% in 2024, to 88% in 2025, and 95% in 2026. In addition to an increase in the number of university students who use Generative AI, there is also an increase in the amount of time that is spent with Generative

AI. Copylinks ([2025](#), [2026](#)) report that not only do 90% of their US respondents use AI, 73% report an increase in the amount that they use Generative AI since 2024.

The increasing prevalence of usage and extent of usage of Generative AI by university students to support their studies raise important questions concerning the impact that usage has on all aspects of their learning. Careful analysis of this is all the more important given that, as Xia et al. ([2025](#)) argue, AI can both empower students' learning and yet also undermine their learning agency.

Generative AI usage and self-efficacy

While engagement, motivation, and performance are vital aspects of students' experiences with using Generative AI, key to the papers included in this review is the importance of self-efficacy. This conceptual review paper, like Oubibi, Hryshayeva, and Huang ([2025](#)), draws on Bandura ([1997](#)) to define self-efficacy as “confidence in one's capacity to arrange and perform the required actions to accomplish specific objectives” ([2025](#), p. 3942). This theoretical framing is sufficiently broad to encompass the ways

in which self-efficacy has been operationalised in the papers reviewed and frames it in a way that is ideally suited to university students using Generative AI to help them in their studies.

The relevance of examining the impact of student use of Generative AI on their reported self-efficacy has an intuitive relevance—here is a multifaceted resource that students can delegate entire assessments to on the one hand or check their understanding, practice their skills, and receive valuable feedback from on the other. Badger's (2026) systematic review of seven studies that address self-efficacy notes that, while all of the studies indicated a positive impact of Generative AI on self-efficacy, there was another element to be considered. Badger (2026) reports that the largest of these studies along with demonstrating the potential of Generative AI to enhance self-efficacy notes that there is also the risk of damaging it through students "outsourcing" their work to Generative AI.

Literature that has investigated the impact of Generative AI usage on students' reported self-efficacy has produced insightful but conflicting results. Ren, Stephens, and Lee's (2026) meta-analysis of 23 empirical studies identified that usage of Generative AI had a significant positive impact on self-efficacy in learning contexts – the effect size for university students being 0.813, $p < 0.05$ – with Q-stat of 213.1 ($p < 0.05$) and I² of 89.7 indicating substantial heterogeneity. Ren, Stephens, and Lee (2026) note that the positive effect was present for all disciplines but was greater for students of natural science and medical disciplines as compared with humanities students. Ren, Stephens & Lee further report that the positive effect of Generative AI usage on self-efficacy was significantly greater when the specific AI used was an intelligent, learning-relevant tool that enabled students to "personalise their learning" (2026, p. 11) to their study requirements. By contrast, studies where the role of Generative AI was "multi-purpose and used as a mixed tool" (2026, p. 10) were found to have significantly lower effect sizes.

In contrast to Ren, Stephens and Lee's findings, Deng et al. (2025) found that whilst Generative AI has a positive impact on improvement in student users' "academic performance, affective-motivational states, and higher-order thinking propensities" there was "no significant effect on self-efficacy" (2024, p. 1). Deng et al.'s (2025) systematic review and meta-analysis drew on 69 experimental studies and focused specifically on the impact of students' usage of Chat GPT on their self-efficacy.

These contrasting analyses suggest that the impact on student self-efficacy of using multi-purpose Generative AI platforms (including Chat GPT) may differ from that of using more specifically, focused Generative AI, and that the intersection of the Generative AI tool and the discipline being studied is relevant. However, above all they indicate that further research is needed to better understand what factors help to determine if students' use of Generative AI is likely to enhance or diminish their reported self-efficacy.

The review question is: What are the factors that help to determine whether university students' use of Generative AI is likely to enhance their reported self-efficacy?

Method

A systematically informed conceptual review was conducted, the process of which is recorded in the PRISMA 2020 flow diagram (Figure 1).

Search and reduplication

Web of Science was selected as the database for this systematically informed review and the following Boolean search term was used ("generative AI" OR "generative artificial intelligence" OR "large language model*" OR "foundation model*" OR "foundation models" OR "LLM*" OR "AI model*") AND (university OR college OR higher OR undergraduate OR postgraduate) AND (Students OR Students) AND (Agency OR efficacy OR "self-efficacy").

This search term was developed to capture the potential impact of university students' Generative AI usage on their reported self-efficacy or agency. The date range was restricted to 2025 and 2026 for two reasons: first, it provided a more manageable data set to work with; second, (and most importantly), the rate of change in Generative AI provision and capabilities indicated that a contemporary focus would ensure that the findings had more relevance.

Web of Science deduplicated the records it returned for the search. The 148 retrieved records were imported into Zotero and checked using automatic duplicate detection and manual inspection. This process resulted in no additional duplicates being detected.

Screening and exclusion

The specific date (2025–2026) and topic (Generative AI impact on agency or self-efficacy) criteria were used to screen the 148 records identified by Web of Science. At this stage, records were excluded because the studies did not address the impact of Generative AI on the self-efficacy of university students ($n = 108$). Further analysis of the reports led to 11 papers being excluded as they did not address the impact of Generative AI on university students and an additional paper being excluded because it had a mental health focus that differed from the other included papers, leaving 28 papers in the review.

As the aim of this review was conceptual rather than a quantitative synthesis, the author we undertook a purposive selection of 16 studies that provided the richest conceptualization of mechanisms linking Generative AI use to university students' self-efficacy. These 16 papers formed the analytic basis of the review. An additional three papers from the pool of 28 informed wider contextual statements regarding the focus of the review.

It is important to note that in the original 148 records identified, self-efficacy was often addressed as a mediating and sometimes moderating factor in papers focused on how self-efficacy and agency influenced other variables of interest, such as motivation to engage with Generative AI. In this review, however, the interest was on what impact, if any, Generative AI usage was found to have on students' reported self-efficacy, and thus papers that did not focus on self-efficacy as a key "outcome" (influenced by rather than influencing of) were excluded.

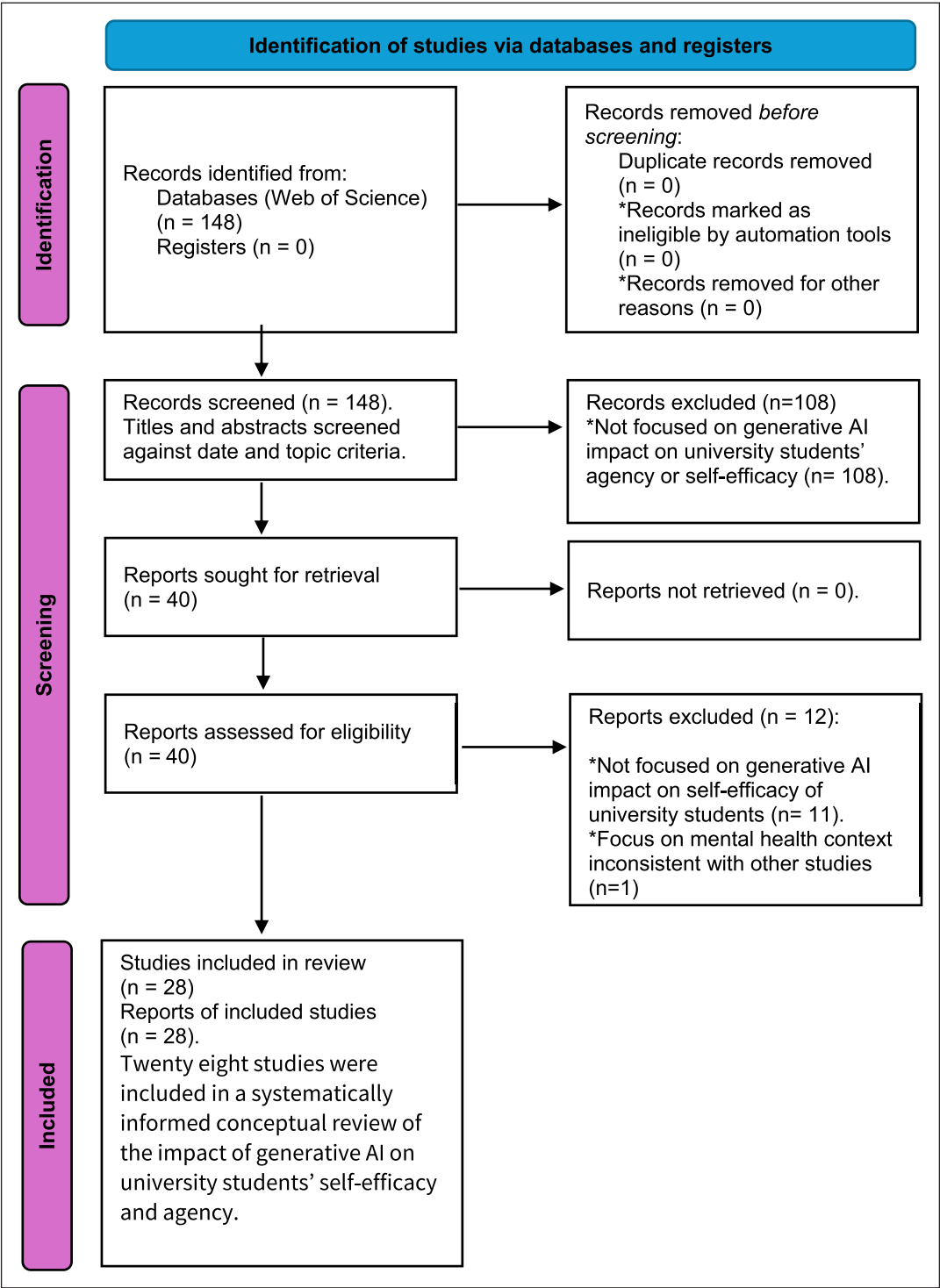


Figure 1: PRISMA 2020 flow diagram.

Results

This systematically informed conceptual review aimed to address the question: What are the factors that help to determine whether university students' use of Generative AI is likely to enhance their reported self-efficacy?

The analytic focus of this review is targeted on the 16 most relevant of the 28 relevant papers that were identified in the systematic review process. The analysis identifies the core factors of pedagogic support, usefulness for task and unique affordances - these are present below:

1. Pedagogic support

The papers in this review identified that the support that was offered concerning the specific Generative AI platform being used was very important in helping to ensure that it had a positive impact on students' self-efficacy. Particular emphasis was placed on the importance of pedagogic support in which the university provided information about the Generative AI platforms that they would use and facilitated students in using it. This was found to be important across both disciplines and types of Generative AI.

Li, Liu, and Dong (2025) note the distinct benefits of Generative AI in programming contexts for enhancing learners' self-efficacy but argue that the role of instructors is critical as they can provide a crucial integration of Generative AI tools such as Chat GPT into self-learning activities. Yu, Fu, and Zhong (2026) note that there were "more pronounced improvements in self-efficacy under favourable support conditions" (2026, p. 1). Their research identifies the particular role that enrichment sessions can play, enabling students to learn more about Generative AI.

Zhuang and Li (2026) report on a study in which a preparation phase was used to ensure that students were made familiar with with the very carefully embedded Generative AI resources used to support their learning. The result was that the experimental group as compared to the control group reported very significantly higher self-efficacy $p < 0.001$. Wan, Woo, and Ho (2025) argue that in addition to specific Generative AI tool support, the wider scaffolding provided by ethical and reflective pedagogies enhances the positive impact that usage can have on self-efficacy.

2. Usefulness for task

Usefulness can be thought of as comprising both the quality and relevance of the output that the Generative AI platforms offer for the specific task at hand. Where Generative AI platforms produce high-quality text, sound, and images, students experience greater self-efficacy. Bai and Wang (2025) found that the reported quality of the interaction between student user and Generative AI was positively associated with creative self-efficacy. Similarly, Kittredge et al. (2025) found that users of a language acquisition app reported increased self-efficacy in that language having benefited particularly from the multi-modal and interactive properties of the app.

Lee et al. (2025) identified that receiving personalized, targeted, and actionable feedback reports from a generative AI tool significantly enhanced self-efficacy in students' developing skills in Logical Thinking, Algorithms, and Debugging. Likewise, Li et al. (2025) found that the programming students supported by Generative AI significantly outperformed the control group in self-efficacy.

3. Unique affordances

Liu et al.'s (2026) systematic review identified that "LLM chatbots" can, through their "immediate personalized feedback, information retrieval and interactive question and answer" have a positive impact on student self-efficacy and agency." Díaz (2026) notes the particular relevance of these unique affordances for training students in diagnosis, arguing that combining diagnosis training with Generative AI enables students to benefit from with an interactive experience that simulates real-life scenarios. Chen, et al. (2025) likewise found that a specific Generative AI resource, Role Playing Gen AI, overcame the potential limits in relying on finding others with whom to undertake role play activities.

Chen, Mokmin, and Su (2025) found that a ChatGPT system that provided immediate, person-specific feedback significantly enhanced student reported self-efficacy (Zhang, Zhang & Wu 2026). The qualitative findings indicated that students boosted

learning confidence through engaging with GenAI-IDLE speaking practice. Finally, this study enriches the current explorations about IDLE activities by unveiling the potential of AI-powered chatbots in facilitating intrinsic motivation and speaking self-efficacy.

4. Combinations of the core factors

Li, Liu, and Dong (2025) point out that the supportive environment for students introduced to using Generative AI in their programming course was crucial to the students experiencing enhanced self-efficacy. Similarly, Shi et al (2025), in the context of nursing training that included a substantial focus on Generative AI, found that training alongside the introduction of the Generative AI to be used helped the self-efficacy of trainees to significantly increase. Chen et al. (2025) likewise found that integrating the Generative AI as an embedded part of the students' training was a key factor in ensuring that it had a positive impact on students' reported self-efficacy.

The importance of combining training and the unique affordances of Generative AI was found in the work of Pellas (2026) who conducted training in which students in the experimental group were introduced to a different way of using Generative AI platforms. Participants in Pellas's experimental group were trained to use Generative AI not as information sources but as Socratic partners, similar to the concept discussed in Dickerson (2024). This enabled the Generative AI to be used for a range of interactive learning tasks such as conceptual clarification and brainstorming. This training alongside the use of Generative AI was associated with greater self-efficacy among the student participants in the experimental group.

Nakajima et al. (2026), who ran a dedicated workshop on creating music using AI, demonstrated evidence that self efficacy improvements can be found even 6 months later in research that combined training with a focus on the unique creative affordances of Generative AI. Nakajima et al. (2026) note that "In particular, the 'creating' experience through generative AI and music appears to have enhanced students' creative self-efficacy, that is, their belief that they are capable of producing creative ideas (2026, p. 94).

Concluding Thoughts

This systematically informed conceptual review has identified a framework of three core principles that help to determine whether Generative AI usage by students will enhance their self-esteem. these are: *Pedagogic Support*, *Usefulness for Task* and *Unique Affordances*. Each of these three can be understood as crucially intertwined with self-efficacy.

First, they each *facilitate experiences of mastery* – pedagogic support enables students to be familiar with the specific AI tool and how it can be successfully used, experiencing the tool as useful for the task and being aware of its unique affordances further clinches the identification of the Generative AI with experiences of mastery.

Second, each of the three core principles provides a *sense of boundary* – of separation between the role of *Generative AI* in this task and *that of the student*. Pedagogic support explicitly

addresses this very issue, delineating what the Generative AI can contribute and what is down to the student. Likewise, the more that the Generative AI is seen as fitted to a particular task which it is uniquely suited to the more cleanly the student can understand their crucial role in the task at hand.

Third, the three core principles of *pedagogic support, usefulness for task and unique affordances* each affirm the student in the process. Of the three, pedagogic support is particularly important here. Strong pedagogic support identifies the limitations of what the Generative AI tool can offer, pointing out the potential biases and errors of the Generative AI tool. Furthermore, it explicitly affirms the student's crucial contribution to the process.

Implications

Far from Generative AI usage inevitably resulting in either a loss or increase of self-efficacy this review has argued that its impact is at least partly in the hands of governments, industry, and educators:

- Governments should build self-efficacy into its Generative AI and education policy.
- Industry should develop Generative AI resources that can enhance users' self-efficacy.
- Educators should deploy Generative AI that is well fitted to the tasks that students are addressing and do so in a supportive, awareness-raising, and empowering environment.

Approached in this way, Generative AI can support the inclusive and equitable quality of learning for all that is central to Sustainable Development Goal 4 (SDG 4). Generative AI can potentially offer all student users the experience of empowerment that is associated with enhanced self-efficacy, but whether it does so or not depends crucially on the extent to which the triple Helix of government, industry, and educators embraces the challenge and thereby facilitates this valuable potential.

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