A Systematic Literature Review Mapping Evidence on Generative AI, Self-directed Learning and Open Education

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Abstract

There is no doubt that generative AI (GenAI) is reshaping education. It influences how learners access knowledge, create content and receive feedback. At the same time, Open Educational Resources (OER) and Open Educational Practices (OEP) continue to expand opportunities for equitable access and the co-creation of knowledge. The importance of self-directed learning (SDL) has become even more crucial in an educational context that is constantly changing due to innovations such as GenAI and open education. Yet the intersections between GenAI, SDL, and open education are not well consolidated across recent scholarship. Facilitators and institutions face uncertainty about what is known, what is contested and where the gaps in the research lie. This paper presents a systematic literature review (SLR) of peer-reviewed journal articles and book chapters published between 2022 and 2026 that examine the relationships among GenAI, SDL and open education. Following a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach, searches will be conducted across major education and interdisciplinary databases using a systematic search strategy. After screening 425 initially identified texts, 11 texts were included in the final corpus and coded using ATLAS.ti. Data analysis involved thematic analysis, identifying recurring patterns related to the concepts of the study. The review mapped how GenAI is conceptualised in relation to SDL, including planning, monitoring, reflection and self-assessment, and how OER and OEP are positioned in GenAI-enabled learning environments. The findings suggest that GenAI may support SDL and open education through feedback, explanations, personalised support, OER adaptation and co-creation. However, the corpus also highlights risks related to overdependence, inaccurate outputs, hallucinations, bias, academic integrity, weak contextualisation, licensing, attribution and quality assurance. The paper contributes a synthesis of emerging evidence and proposes implications for teaching practice, OER design and policy guidance in GenAI-rich open learning environments.

Keywords: *Generative artificial intelligence (GenAI), self-directed learning (SDL), open educational resources (OER), open educational practices (OEP), systematic literature review, learner agency.*

1. Background and Motivation

Generative artificial intelligence (GenAI) is changing how users access information, generate text [1], receive feedback [2] and engage with open educational resources [3]. These developments create opportunities for personalised learning, feedback and resource adaptation, but also raise concerns about accuracy, bias, academic integrity and overdependence.

These matters are particularly relevant to open education. Open education emphasises access, sharing, adaptation, co-creation [4]. In principle, GenAI may support open education by assisting with the revision, remixing, localisation and adaptation of OER. However, GenAI does not automatically strengthen openness. Questions about licensing, attribution, transparency and quality assurance complicate its relationship with open education [5]. Self-directed learning (SDL) is central to this discussion. In GenAI-rich and open learning environments, SDL requires learners to identify learning needs, select appropriate tools, evaluate information, monitor progress and make informed decisions. [6] describe ChatGPT-integrated SDL as an iterative process of planning, monitoring, adapting and evaluating learning, while [7] emphasise the need for learners to critically evaluate information in an AI-saturated environment. This means that critical thinking, AI literacy, ethical awareness and reflective judgement become central to SDL. Although GenAI can support SDL through feedback, explanations, learning pathways and resource recommendations, it may also weaken SDL if learners become dependent on AI-generated outputs. Navas Bonilla and colleagues specifically warn that excessive AI use may reduce autonomy, critical thinking and independent decision-making [8].

The relationship between GenAI, SDL and open education is still emerging and is still quite fragmented due to the newness of GenAI in the academic space. A systematic review of these concepts is needed

to map what has already been researched, what is known and where the gaps in literature remain. The main research question that will be explored in this paper is: *What evidence exists on the relationship between GenAI, SDL and open education?*

2. Conceptual and Theoretical Framework

2.1 Generative AI in Education

Artificial intelligence (AI) is no new phenomena. Generative AI has attracted worldwide attention with the introduction of Chat Generative Pre-trained Transformer (ChatGPT) in late 2022 [9]. Since then, several large language models and GenAI tools have become visible in education, including ChatGPT, Claude, DeepSeek, Microsoft Copilot, Google Gemini and DALL·E. Generative AI can generate human-like multimodal content such as text, audio, image and video [9]. This has brought both challenges and opportunities in various fields [9; 10], including education.
Generative AI has assumed different roles in the education space, such as that of a tool [11], a learning partner [12], a tutor system [13], a means of providing feedback [14], content generator [15] and assistant to adapt resources [3]. These roles indicate that GenAI operates along a spectrum of support. It may assist with producing, adapting and organising learning materials, while also supporting more personalised and responsive forms of engagement.

2.2 Self-directed Learning

Self-directed learning is described by Knowles [16] as a “process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes” (p 18). This definition remains useful because it foregrounds learner responsibility, goal setting, resource identification, strategy selection and evaluation. In the context of GenAI, SDL becomes even more crucial than before because students need to exercise even more agency in these environments. Students need to find relevant information, decide which technology tools are suitable, reliable and appropriate, how to evaluate their outcomes and how to integrate this into their learning process [6]. Because GenAI is prone to bias, errors and weak contextualisation, students must now apply critical thinking more rigorously than ever. They need to interrogate the accuracy, relevance and trustworthiness of AI-generated material. Li and colleagues [17] highlight hallucinations and inaccuracies as major challenges, while Ma et al. [7] contend that students must critically appraise information in an AI-permeated environment. GenAI thus demands greater SDL, yet it can also undermine SDL if students become overly reliant on AI outputs.

2.3 Open Education

Open education is described in broad terms in literature and extends beyond only the use of open educational resources (OER). It is associated with learning innovations and learning quality [18], employing the use of resources, tools and practices to improve access to education [19]. The Cape Town Open Education Declaration [20] also presents open education as broader than OER, including open technologies, collaborative learning, flexible learning and the sharing of teaching practices. Stracke’s [18] definition presents the quality-oriented dimension by describing open education as follows: “Open Education is designing, realizing, and evaluating learning opportunities with visionary, operational, and legal openness to improve learning quality for the learners” (p. 184). This definition is useful because it links openness with design, implementation, evaluation and learning quality. Open education is therefore not only about making content available, but also about how learning opportunities are created, adapted, shared and improved.
OER remain central to open education because they support reuse, revision, remixing, redistribution and retention. However, open education also includes OEP. Cronin [21] defines OEP as “practices that include the creation, use and reuse of open educational resources (OER) as well as open pedagogies and the open sharing of teaching practices” (p. 18). For this paper, open education is understood as an educational approach that uses open resources, technologies and practices to widen access, support adaptation, encourage collaboration and improve learning quality.

2.4 Integrating to a Conceptual Framework

There is a mutual relationship between these concepts. Generative AI may support open education by helping facilitators and learners revise, remix and localise OER. It may support SDL by assisting with feedback, finding resources, planning and self-evaluation. So too, open education may support more responsible GenAI use. Tlili et al. [3] contend that OER can help mitigate hallucinations by providing AI systems with openly licensed educational materials that have been created, updated, or adapted by subject-matter experts and facilitators. This review is guided by the assumption that GenAI, SDL and open education intersect around the need for self-directed, critical and ethical learning.

3. Research Design and Methodology

Interpretivist approaches are "useful in understanding the subjective experiences, social phenomena, and complex human interactions" [22] (p. 2314). This study is located within an interpretivist paradigm because it seeks to understand how the selected texts conceptualise and report the relationship between GenAI, SDL and open education. The purpose was not to measure the effectiveness of GenAI, but to interpret patterns, meanings and relationships across the coded corpus.

A qualitative systematic literature review (SLR) was used to identify, screen, code and synthesise peer-reviewed literature relating to the main topic under investigation. An SLR is a method used to locate, assess, and integrate all existing studies that are relevant to a specific research question, subject area, or phenomenon of interest [23; 24]. Different authors present different ways in which an SLR can be conducted, but most acknowledge that certain steps or phases take place in the process [25]. These phases include formulating research questions and inclusion criteria [24], searching, screening and selecting texts [26], data extraction and coding [27] and synthesising the findings.

In this study, the texts were obtained from established databases, including Scopus, ScienceDirect, and Web of Science. Different variations of keywords such as "self-directed learning", "genarative AI" and "open education" were used in the searches. The study was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework [28]. The inclusion criteria focused on texts that were i) peer-reviewed book chapters and research articles, ii) date of publication from 2022 to 2026; iii) texts focusing on SDL, open education and GenAI; iv) English texts; v) review papers, conceptual work, and empirical research;and vi) texts that contained infromation on SDL, open eduction and GenAI. Eleven texts resulted from the search and screening process which were coded and analysed using ATLAS.ti. A total of 425 texts were identified in the initial searches. After unsuitable texts and duplicates were removed, 11 texts remained for coding.

A thematic analysis approach was used to categorise the selected texts using the six-phase process outlined by [29]. This process allows the researcher to identify and report recurring themes from the qualitative data and thereby provides insight into the topic under study. Inductive coding was used to discover emerging themes while coding the texts [30]. The findings and discussion which emanated from the review follows in the next section.

4. Findings and Discussion

4.1 Profile of the Corpus: Research Designs, Data Sources and Contexts

The corpus reflects a variety of methodologies. As illustrated in Table 1, the coded texts are situated mainly in higher education, open and distance learning, online language learning and open education contexts. The corpus includes formal educational settings, such as Sri Lankan state universities and a South African ODeL university, and more open digital learning spaces, such as YouTube-based language learning communities.

Table 1. Profile of the corpus

Text	Research design	Data sources	Educational context
Ahmadfart [31]	Structured literature review and thematic synthesis	Database search and reviewed literature	Open education Interactive open educational resources (iOER)
Biyiri et al. [32]	Quantitative, deductive survey study	Online questionnaire; 627 undergraduate responses	Sri Lankan state universities

Bosch and Kruger [33]	Conceptual paper	Literature-based conceptual discussion	SDL, student agency and AI chatbots as OER
Bunt and Bunt [34]	Analytical autoethnography	Reflection on the design of *Prosper*	Sustainability education Game-based learning
Laubscher et al. [35]	Theory-synthesis	Literature-based synthesis	OEP, 4IR and SDL
Li et al. [6]	Qualitative phenomenological study	Interviews with 19 YouTubers who are experienced self-directed language learners	Self-directed language learning (SDLL)
Li et al. [17]	Qualitative study	Semi-structured interviews conducted with 14 facilitators of online language courses	Online language facilitators
Maphalala [36]	Qualitative phenomenological study	Interviews with four academics and focus group discussions involving ten fourth-year BEd students	South African ODeL
Navas Bonilla et al. [8]	PRISMA-based systematic review	Scopus and Web of Science; 77 studies	AI and SDL
Ruiz-Rojas and Acosta-Vargas [37]	Qualitative exploratory study	Interviews, observation and student-created artefacts	MOOC development
Tlili et al. [5]	Scenario and conceptual contribution	OEP-based scenarios	Open education and GenAI

Table 1 shows that the corpus includes review-based, conceptual, qualitative and quantitative contributions. Review-based texts, such as Ahmadfart [31] and Navas Bonilla et al. [8], provide broader mappings of iOER, AI and SDL. Conceptual and theory-synthesis texts, such as Bosch and Kruger [33], Laubscher et al. [35], and Tlili et al. [25], help clarify the relationships between SDL, OER, OEP, AI and digital transformation. The qualitative studies provide insight into participant experiences, while Biyiri et al. [32] offers survey-based evidence on undergraduate acceptance and use of ChatGPT for SDL.

The data collection methods also varied. They included structured database searches, online questionnaires, semi-structured interviews, focus groups, observations and student-created artefacts. This variety of data sources presents a broad spectrum of data for this review. However, the most common data source is that of reviews, conceptual work, perception-based studies and exploratory qualitative research. There is less evidence of longitudinal studies or sustained observation of actual GenAI-supported SDL practices over time. Also the lack of quantitative studies also skews the evidence presented in this review. This suggests that the field is still developing and that future research should move beyond perceptions and conceptual arguments towards studies that examine how learners and facilitators use GenAI in practice.

4.2 Conceptual Links between Generative AI, Self-Directed Learning and Open Education

Due to the inclusion criteria, the corpus does not present GenAI, SDL and open education as isolated concepts. Instead, the texts show several points of connection. Open education is framed as more than access to resources alone. Ahmadfart [31] positions iOER as “a next-generation direction” (p. 1) within open education, where openly licensed resources include interactive features such as “simulations, branching scenarios, formative assessments, feedback mechanisms and adaptive digital features” (p. 2). This shifts open education from the dissemination of content towards more purposeful instructional design. Bosch and Kruger [33] also connect OER to access, adaptation and sharing, while Laubscher et al. [35] emphasise that OEP and SDL connect strongly where learners become active co-creators of knowledge.

Bosch and Kruger [33] refer to Knowles’ definition of SDL. They further associate SDL with initiative, independence, persistence, self-discipline, curiosity and confidence. They further argue that learners need opportunities to make choices about what and how they learn. Bunt and Bunt [34] link SDL to “autonomy, exploration and ownership of learning” (p. 37) in the design of the educational game *Prosper*. Li et al. [6] place SDL in the context of ChatGPT use, arguing that learners can explore the tool, experiment with conversational strategies and evaluate whether it supports their learning goals.

The strongest conceptual connection across the corpus is learner agency. Bosch and Kruger [33] clearly portray the relationship between SDL, OER, and AI as an environment in which learners are able to co-create learning materials, define their own objectives, and actively design their educational experiences.

Ahmadfart [31] similarly argues that GenAI can enhance open pedagogy when it is woven into learning activities that require reflection and learner agency. Tlili et al. [5] extend this idea by arguing that OEP can support the safe and effective adoption of GenAI. Their contribution is important because it does not only ask how GenAI can enhance open education, but also how open education can enhance GenAI use. GenAI may support SDL and open education when it strengthens learner agency, participation, reflection and responsible use. However, it may undermine these aims when it is used merely to generate answers or when learners become dependent on automated outputs.

4.3 Roles and Capabilities of GenerativeAI Tools

The corpus presents GenAI as a multifunctional educational tool. Ahmadfart [31] describes GenAI as useful for drafting content quickly, translation, summarising and adapting OER while remaining sensitive to the context. This matters in open education because fixed resources are frequently hard to adapt for local contexts, revise, customise, or integrate into more complex pedagogical designs. In this sense, GenAI is used as a tool for both the creation and adaptation of resources.

ChatGPT is the most commonly used GenAI tool in the corpus. Biyiri et al. [32] investigated university students' acceptance and use of ChatGPT for SDL. They reported that performance expectancy and social influence shaped their behavioural intention. They also found that both behavioural intention and facilitating conditions determined students' actual use. Navas Bonilla et al. [8] also identify ChatGPT as the most widely used conversational assistant in the studies they reviewed. They explain this by pointing to its ease of use, broad range of applications, and consistent, well-structured answers.

The corpus further shows that GenAI tools support several learning processes. Navas Bonilla et al. [8] identify several learning processes into which GenAI has been incorporated. These processes include feedback, tutoring and mentoring, assessment and self-assessment, learning design, practical application, and research and exploration. Maphalala [36] reports that AI tools in ODeL settings supported personalised feedback, the finding of resources, increased engagement, language development and self-evaluation. In that study, ChatGPT and Notion AI were used for writing support, content clarification, note organisation, feedback and the summarising of content.

GenAI also appears as a tool for open pedagogy. Tlili and colleagues [5] suggest that teachers and students collaboratively write prompts, run them, evaluate the outputs and compile the prompts as OER. This is a practical example of how GenAI, SDL and open education connect with each other. Learners are not simply consuming AI-generated responses. They are participating in prompt development, evaluation and sharing. Tlili et al. [5] also propose the construction of an OER-based GPT model, where evidence-based information from OER could be integrated into a more directed system that can be updated over time.

The reported benefits in the corpus therefore include personalisation, feedback, learner agency, collaboration, inclusivity, participation, adaptation and co-creation. Ahmadfart [31] indicates that iOER can foster learner agency, collaboration, and inclusivity by means of interactive elements, adaptive technologies, multimedia resources, and integrated assessment tools. Biyiri et al. [32] adds that because younger students are more technologically adaptable, they might not experience ease of use as a major barrier to ChatGPT adoption.

4.4 Challenges and Tensions

The corpus also reports several challenges that complicate the relationship between GenAI, SDL and open education. Regarding open education, Ahmadfart [31] observes that traditional OER have enhanced both access and affordability, yet their static format tends to constrain learner engagement, adaptability, and personalisation. The move toward iOER addresses this constraint, but also brings new challenges, such as ensuring digital access, institutional preparedness, and faculty development. Institutional capacity is a recurring concern. Ahmadfart [31] reports that the development of high-quality interactive materials requires expertise in the creation of content, instructional design, programming and graphics. This may lead to substantial development expenses and added complexity, especially for institutions that have limited resources. Bosch and Kruger [33] also identify facilitator-related challenges, including different levels of proficiency in the use of technology, possible misalignment with pedagogical principles and limited awareness of AI capabilities. They also mention ethical and privacy concerns and the need for professional development in these areas.

The GenAI-related challenges are closely linked to SDL. Navas Bonilla et al. [8] warn that overreliance on AI has a negative impact on learner autonomy and critical thinking. These authors also assert that the dependence on technology can lead to cognitive overload and could cause students to become

disconnected from their own learning process. They also note that when students delegate their decision-making to algorithms, this may limit their ability to "develop independent judgement, initiative, and creativity" (p. 14). Maphalala [36] reports similar concerns in the ODeL context, where participants raised issues of over-dependence, academic dishonesty, unreliable AI-generated information and reduced social interaction and critical thinking.

Reliability is another important challenge. Li et al. [17] report that hallucinations and inaccuracies are problematic in language learning because learners may encounter incorrect factual information or wrong explanations of the language system. The same text also notes that AI-generated content can be monotonous, repetitive and lacking in cultural or linguistic specificity. These findings suggest that GenAI can only support SDL if learners develop the capacity to question and verify AI outputs.

The corpus also raises concerns about openness itself. Tlili et al. [5] caution against "open-washing" (p. 406), where a tool is said to be open while still being based in restricted access and private profit. This is important for open education because free access is not the same as openness. Openness also requires transparency, adaptability, reuse, participation and collaboration.

4.5 Recommendations and Future Research Directions

The recommendations in the corpus emphasise that GenAI-supported SDL and open education require intentional, ethical and human-centred implementation. Ahmadfart [31] argues that realising the potential of iOER requires institutional investment, the training of facilitators and the development of scalable infrastructure. The same text also stresses the need to address digital equity, especially access to devices and connectivity. Maphalala [36] likewise advocates for well-defined institutional policies and support systems to promote fair access and ensure digital preparedness.

AI literacy is another recurring recommendation. Tlili et al. [5] argue that teachers should introduce the responsible use of GenAI before integrating it into learning activities. Li et al. [6] describe prompt engineering as a strategy that can enable learners to use ChatGPT more effectively in support of SDL. Across these texts, learners need support to use GenAI critically, responsibly and purposefully. Open pedagogy is also recommended as a practical way to integrate GenAI, SDL and open education. Tlili et al. [5] suggest that teachers and students can co-develop prompts, assess GenAI outputs and share prompts as OER. This positions learners as active participants in the teaching and learning process. It also links AI literacy to open knowledge creation.

The corpus further recommends collaboration and quality assurance. Ahmadfart [31] emphasizes the importance of ongoing feedback from both teachers and students, as well as cooperation between subject-matter experts, instructional designers, and media professionals. Tlili et al. [5] recommend collaboration across fields such as computer science, psychology and design. These recommendations suggest that GenAI-supported open education cannot be left to individual facilitators or learners alone. It requires coordinated institutional and interdisciplinary support.

Future research suggestions in the corpus confirm that the field is still developing. Ahmadfart [31] notes that the research base remains fragmented, with many studies being discipline-specific, small-scale or limited in methodological rigour. Biyiri et al. [32] call for qualitative research on students' experiences and perceptions of ChatGPT to support SDL. Maphalala [36] advocates using larger, more heterogeneous samples that span various disciplines, institutions, and educational stages. He further recommends further research in structured AI literacy programmes for students and staff which can foster critical thinking and collaborative learning. Li et al. [6] recommend triangulating data with observations of learners' SDL processes and conducting longitudinal studies on the long-term impact of AI-integrated SDL.

The future research directions also point to the need for more context-sensitive work. Navas Bonilla et al. [8] recommend research across educational levels, disciplines and cultural contexts. Maphalala [36] explicitly highlights the necessity for models that account for AI-mediated SDL within digitally unequal environments, particularly in regions like the Global South. Overall, the corpus suggests that future research should move beyond tool adoption and examine how GenAI, SDL and open education can be integrated in ways that are ethical, inclusive, pedagogically sound and responsive to context.

4. Conclusion

This systematic literature review provided evidence on the relationship between GenAI, SDL and open education. The corpus shows that GenAI may support SDL through feedback, explanations, resource discovery, learning planning and personalised support. It may also support open education by assisting with the revision, remixing, localisation and adaptation of OER. However, the relationship is not

automatically positive. The corpus also highlights risks related to overdependence, inaccurate outputs, hallucinations, bias, academic integrity, weak contextualisation, licensing, attribution and quality assurance. These risks are especially important because SDL depends on learner agency, critical thinking, reflection and informed decision-making. The review therefore suggests that GenAI can contribute to SDL in open education when it is used ethically, critically and pedagogically. Its value depends on AI literacy, facilitator guidance, institutional support, digital equity and quality assurance. Future research should move beyond tool adoption and examine how learners and facilitators use GenAI in practice, especially in diverse and digitally unequal contexts.

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