INNOVATION IN LANGUAGE LEARNING International Conference

Towards Progressive Weaning: Training Students to Use GenAI for Self-Regulated ESP Learning

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Abstract

The fast growth of Generative Artificial Intelligence (GenAI), especially generative AI, has changed teaching and learning English for specific purposes (ESP). It has also changed the relationship between teachers and students and made traditional classrooms seem old-fashioned. This study used a variety of research methods to explore ways to change ESP teachers' roles so that they can support ethical use of GenAI and self-regulated learning (SRL). The study looked at 56 third-year students from different subjects at the Faculty of Humanities and Social Sciences, Batna 1 University. Participants created personalized ESP lessons using a GenAI tool (Gemini Notebook) that was adapted to suit their levels of proficiency, cognitive abilities, and preferences. The results showed that the students became more independent and confident over time. There were also significant improvements in how well they could communicate, how much they knew about ethical AI, and how the lesson was adapted to each student. The majority of participants reported a satisfactory experience.

Keywords: *generative AI, self-regulated learning (SRL), ethical GenAI literacy, ESP teaching-learning, ethical GenAI literacy, lesson personalization.*

1. Introduction

Generative artificial intelligence (GenAI) is changing the way students access information and learn languages. In ESP, it offers opportunities for more flexible and personalized learning while progressively changing the traditional roles of teachers and students. This study shows that, when carefully guided by the teacher, GenAI can support self-regulated learning, communication skills, personalized learning, and responsible use of AI.

Rather than treating AI as an alternative to teachers, the study emphasizes its value as a critical learning tool. With teacher mediation, participants progressively assumed greater responsibility for selecting, adapting, evaluating, and revising AI-supported learning materials. Therefore, the findings suggest that a structured, teacher-guided approach can help integrate GenAI into ESP while also promoting learner autonomy and the ethical use of AI.

2. Literature Review

2.1 AI Impact on ESP Learning Outcomes and Motivation

Adopting AI in education is becoming more and more important in ESP, given that learners need to know both languages and technology [2]. The way people are taught in schools and universities might not always be able to deal with differences in language skills, professional goals, and how people learn [3, 9]. This is exactly where GenAI can adapt by offering a learning experience that is more personalized and flexible.

According to recent studies, GenAI can have a positive effect on writing, communication, motivation, engagement, and collaboration in ESP [3, 7, 13]. However, there are concerns about AI dependency, inaccurate information, academic integrity, and reduced critical thinking [1, 6, 15, 20]. Additionally, AI tools may not be effective enough for ESP learners who speak more than one language and are studying different subjects [2].

2.2 Evolving Teacher Roles in ESP Through GenAI

As a result of GenAI spreading within academic circles, the teacher's role is shifting from content provider to facilitator, instructional designer, mentor, and ethical guide [12, 18, 25]. In lieu of replacing

teachers, AI has the potential to function as a teaching assistant, the effectiveness of which is contingent on human supervision [20].
This shift is mainly related to SRL. In addition to designing and monitoring activities, teachers are responsible for helping students determine when and how to use AI. Teachers are also supposed to evaluate AI outputs and integrate its feedback across the planning, performance, and self-reflection phases [12]. Given the assumption that GenAI has the potential to facilitate metacognition and learner agency without replacing self-regulatory abilities [24], it is therefore vital to emphasize the importance of manipulating AI under teacher guidance to avoid superficial learning outcomes [20].

2.3 AI Impact on ESP Self-Regulated Learning

As assumed by the majority of the related literature, self-regulated learning (SRL) involves regulating cognition, motivation, and behavior via objective setting, strategy use, monitoring, evaluation, and adaptation [17, 10, 19]. Three main phases demarcate SRL, including forethought, performance, and self-reflection, associated with autonomous learning and academic achievement [5, 23].
Although GenAI can support self-regulated learning by providing feedback, explanations, and opportunities for revision, simply having access to AI does not necessarily develop learners' capacity to self-orchestrate their learning. This can be attributed to the fact that learners still need explicit guidance to plan, monitor, evaluate, and reflect on their learning processes [16, 26]. In ESP contexts, the use of AI alongside explicit SRL strategies has been linked to improved vocabulary learning and greater satisfaction with the learning process [21]. Metacognitive support may further contribute to the development of SRL; however, advances in self-regulation do not always lead to better academic achievement right away [22]. Therefore, the use of GenAI can be beneficial only when its use is explicitly associated with clear SRL and metacognitive support.

2.4 Ethics, Overreliance, and Conditions for Effective Use

GenAI integration in academia also gives rise to issues regarding overreliance, inaccurate or biased information, plagiarism, ethical academic practices, in addition to the possible reduction of critical reasoning [4, 6, 8]. It is these very concerns that underpin the reluctance of faculty members to adopt GenAI in educational settings. Therefore, it is more appropriate to consider it as a supplementary resource to support, rather than a substitute for, human teaching and learning.
Consequently, in order to maximize the benefits of GenAI, it is imperative for teachers to ensure supervision and for students to deal ethically and be aware of how GenAI functions. Teachers can use professional expertise to use GenAI in ways that respect learners' freedom and academic standards [12; 13, 14, 20]. GenAI and LLMs can also be used to assess students, but only with caution and under full human supervision [11].
The extant literature also demonstrates the capacity of GenAI to facilitate ESP and SRL learning, provided it is employed in conjunction with clear self-regulatory strategies on the part of learners and with the appropriate ethical rules on the part of both teachers and learners. These findings provide the theoretical basis for the present study to examine GenAI effects on students' self-regulation, communicative development, personalization, and responsible use.

3. Methodology and Results

3.1 Research Design

The intervention used a mixed-methods experimental approach to examine the potential influence of a teacher-guided, GenAI-supported ESP intervention (IV) on students' self-regulated learning (SRL) and learner autonomy (DV). To elaborate further, the intervention methodically guided students in using the Gemini Notebook software to generate, personalize, evaluate, and revise their own ESP learning materials, with teacher guidance being progressively substituted for greater student autonomy.
While the quantitative evidence of this intervention was derived from the meticulous observation of the participants' performance, the qualitative evidence was collected through the administration of open-ended questionnaires prior to and following the intervention.
The primary concern of the study was the analysis of SRL and learner autonomy (DV); particular attention was given to participants' ability to formulate coherent plans, to effectively monitor their progress, and to provide meaningful evaluations and reflections on their individual learning processes.



Secondary outcomes (DVs) included the students' communicative abilities, their capacity for personalising their learning, and their comprehension of ethical GenAI. The main and secondary dependent variables were assessed using a single overall 20-point performance score. Additional exploratory outcomes (complementary outcomes), encompassing confidence in addition to students' perspectives on the learning process, were collected via the questionnaires.

3.2 Participants and Learning Context

The participants were 56 third-year students from different disciplines at the Faculty of Humanities and Social Sciences, Batna 1 University: 20 students in the Sociology of Deviance and Crime, 13 in Demography, and 23 in Organisational and Labour Sociology. Participants were selected purposively on the basis of their relatively low English proficiency, with mean English scores below 10 during the 2024–2025 academic year.
Initially, 75 students participated in the study; however, 19 students did not complete the intervention, primarily due to their academic workload and attendance issues. However, the final three groups underwent the same experimental procedure, encompassing the number of sessions, thematic sequence, SRL-oriented process, and teacher-mediated approach.

3.3 GenAI-Supported Learning Environment

As a source-grounded AI learning environment, the researcher opted for the introduction of Google's AI-powered research tool, 'Gemini Notebook' (previously known as NotebookLM). This learning-assistant software has been developed for the purpose of assisting users in organizing, exploring, and interacting with selected sources. It enables users to pose questions, generate summaries, identify connections, and transform source material into study-oriented formats.
In contrast to the conventional approach of receiving pre-prepared lessons or pedagogical resources from the instructor, students were enabled to select their own sources, delve into the content, ask questions, create activities, verify information, and modify materials to align with their disciplinary interests, proficiency levels, and, naturally, their individual learning requirements. As a precautionary measure, the researcher ensured that the Gemini Notebook tool was introduced to facilitate the process of learning, not to replace it.

3.4 Experimental Procedure

The present study lasted about seven months and involved three groups working on six themes primarily selected by students. Each theme spanned three sessions, each lasting one and a half hours: a workshop, a presentation, and a discussion, producing 18 sessions per group and 54 sessions overall. During the workshops, students were tasked with developing personalized ESP lessons using the Gemini Notebook software.
During the workshop sessions, students received instructions from their teachers and then proceeded to generate their lessons. In the presentation session, each student was given a period of five minutes to play the role of a teacher by presenting their tailored lesson and justifying their pedagogical decisions. The discussion sessions enabled the teacher and peers to identify problems, evaluate AI-generated content and suggest improvements, as well as practice the ESP language. The teacher's role was thus primarily that of a facilitator and guide. Responsibility for learning was progressively transferred to the students.
In relation to SRL development, students' generation of their lessons followed four interconnected stages. The initial phase of the process is one of planning and goal setting. This involves the identification of their needs, difficulties, and learning objectives. Secondly, the use of Gemini Notebook as a facilitator to generate and adapt ESP activities, including vocabulary, explanations, dialogues, writing tasks, and discipline-related conversations. Thirdly, they critically evaluate the results to ensure accuracy and alignment with the teacher's instructions and their level of proficiency, as well as alignment with ESP-specific terminology. Fourthly, reflective practice entails the identification of difficulties, the revision of materials, and the adjustment of goals or strategies.

3.5 Data Collection and Analytical Focus

As previously stated, the study amalgamated two distinct data sources: a structured observation and performance assessment grid, along with pre- and post-intervention open-ended questionnaires. The data sets under consideration were complementary in nature. Together, they yielded a fuller picture of the present research results. While observational studies and performance assessments documented observable developmental changes, questionnaires were used to capture students' impressions, experiences, and insights.

In more detail, the observation grid demonstrated students' performance throughout the intervention across four main dimensions: SRL and learner autonomy, communicative competence, ethical GenAI literacy, and learning personalization. Students received a single overall mark out of 20 for each thematic activity instead of separate scores for each dimension. By assessing students repeatedly across six cycles, the researcher was able to examine changes in the participants' performance and responsibility over time.

A series of questionnaires were administered to the participants to gain in-depth, qualitative insights into their confidence levels and perceptions of the intervention. This encompasses learning practices, perceived autonomy, use of GenAI, personalization of learning, ethical awareness, confidence, and perceptions of the teacher's changing role. The pre-intervention questionnaire established a baseline, while the post-intervention questionnaire explored students' reflections after completing the intervention.

4. Results

Results indicate an overall progression from relatively teacher-supported and answer-oriented use of GenAI toward a more intentional, critical, and autonomous engagement. Throughout the intervention, students progressively engaged in the identification of their learning needs, the establishment of objectives, the formulation of prompts, the checking of AI-produced content, in addition to the refinement of their self-developed lessons. They gained flexibility in generating content related to their specialty, tailored to their levels of proficiency and preferences.

Both the qualitative and quantitative outcomes showed a strong pre–post improvement associated with the intervention. The calculation of the overall 20-point performance score related to the four main dimensions under study showed an increase from $M = 6.86$ ($SD = 2.08$) in the pre-test to $M = 10.52$ ($SD = 2.50$) in the post-test—i.e., an increase of 3.66 points on average. This difference was statistically significant according to the paired-samples t-test ($t(55) = 22.71$, $p < .001$), with a substantial effect (Cohen's $d = 3.03$). Wilcoxon signed-rank test confirmed a significant direction of the pre-post change ($W = 0$, $p < .001$), with all 56 participants showing improvement.

The following subsections demonstrate the observed and reported developments related to students' SRL and autonomy, communicative competence, ethical GenAI literacy, personalization, and students' confidence and satisfaction. The presented figures represent observational indicators, since the performance assessment basically consisted of a single, aggregated mark per thematic activity, rather than discrete scores for individual dimensions.

4.1 Self-Regulated Learning and Autonomy

With regard to the present research, the most significant development was participants' increased self-regulation and autonomy. At first, 48 participants (86 %) relied heavily on direct prompts and ready-made answers. They were unable to manipulate the introduced software to align with the teacher's instructions, meet their ESP proficiency levels, and preferences. However, as the study progressed, participants became more actively involved in managing their own learning, coming up with their own prompts, asking for explanations, setting clear goals, evaluating the content they received, and even tweaking materials to fit their needs.

On a more qualitative level, progress was noticed in areas like planning, using AI tools purposefully, tracking progress, critically evaluating content, and reflecting on participants' decisions and procedures. After the intervention, 83% of participants reported improved identification of learning needs, and 65% reported more meticulous reflection on their learning. Overall, it was clear that the participants had made significant strides in becoming more independent and self-directed learners.

4.2 Communicative Competence

A noticeable improvement in communicative competence was shown by 39 students (70%). They expanded their subject-specific vocabulary and developed ESP simulation communication skills. As

students progressed, their presentations became more organized, and their spoken performances showed greater confidence and precision. Students' initial concerns, such as being shy or afraid of speaking in front of an audience, seemed to fade away over time. The writing skill was of a high standard, as evidenced by the precise, discipline-related vocabulary and correct grammar. This was evident in prompt generation and activity completion within their generated lessons.
The Gemini Notebook effectively enhanced learning appeal and engagement. The software enabled students to create many activities, such as explanations, conversations, and writing tasks. It also allowed for real-life scenarios that responded to teacher instructions and suited students' ESP proficiency levels. However, this enhancement stemmed not just from the software's content, but also from students actively selecting, adapting, evaluating, and reusing materials, guided by their instructor. This process allowed them to own their learning and develop a more independent study approach.

4.3 Ethical GenAI Literacy

As students went through the intervention, they became more aware of how important it is to use Gemini Notebook critically and responsibly. During the intervention, they became more attentive to inaccuracies, inappropriate terminology, unsupported information, and content that did not correspond to their learning specialities and needs. Engagement in critical skills like fact-checking, error identification, source verification, and content revision increased from 45% to 82% during treatment. After the intervention, 88% reported increased care when verifying AI-generated information, and 93% reported greater awareness of appropriate prompting and critical examination of AI-generated content.

4.4 Personalisation of ESP Learning

Personalisation also demonstrated an increase, although it was not as significant. The proportion of students clearly adapting learning content to their individual needs increased from 7.14% in the initial activities to 11.42% in the final activities. Furthermore, 84% of participants found adapting activities and content to their needs to be the most useful aspect of ESP learning environment. Strong satisfaction was reported regarding the progressive shift toward personalizing their learning. The concept of personalisation was closely intertwined with the notion of SRL, as participants were required to identify their individual needs, formulate objectives, evaluate the material they produced, and determine what to retain, modify, or reject.

4.5 Confidence and Satisfaction

As previously indicated in Section 3.1, although confidence and satisfaction were initially viewed as complementary outcomes rather than primary dependent variables, they nonetheless shed further light on the students' experience in this study, thereby providing a holistic view of the intervention results. The questionnaires indicated high satisfaction levels among participants regarding the flexibility and usefulness of using Gemini Notebook in their ESP learning (85.7 %), self-paced practice (92.9 %), and the development of tailored materials (96.4 %). The majority of participants (96.4%) showed an increase in confidence, reflected in their self-perceptions and their views of the educator and the learning process.

5. Discussion

The substantial enhancement in overall performance, from 6.86 to 10.52, in conjunction with the discernible progression in goal setting, purposeful prompting, monitoring, evaluation, and reflection, is consistent with the extant literature documenting the efficacy of integrating GenAI tools to facilitate self-regulated learning and enhance ESP outcomes and motivation. This assertion is substantiated by the findings presented in sections 2.2 and 2.3.
The findings indicate a shift from relatively blind reliance and answer-oriented use of GenAI toward more purposeful, critical, and increasingly independent learning. This lends support to the hypothesis that the pedagogical value of GenAI relies not solely on access to the technology itself, but rather on its subtle pedagogical integration and manipulation [11]. This lends support to the hypothesis that the educational potential of generative AI depends primarily on its thoughtful pedagogical integration and use, rather than on access to the technology itself [16, 26]. Learners must be provided with targeted assistance throughout the process of planning, monitoring, evaluation, and reflection, thereby supporting effective use of GenAI and ensuring a successful transition to SRL.

Therefore, teacher mediation appears to be quite significant. In this research study, the teacher orchestrated learning by gradually transferring responsibility to the students for the use and evaluation of the Gemini Notebook software. The introduction of this tool was combined with guidance, monitoring, discussion, and the progressive transfer of responsibility to the students. The findings largely support the previously reported conclusions within the context of a human-centered framework [6, 11, 12, 18, 20, 25]. This framework posits the teacher as both a facilitator and an ethical guide within educational settings supported by GenAI technology. This positions GenAI as a learning tool requiring continuous monitoring by teachers and trained learners for ethical reasons, rather than as a substitute for the teacher.

In line with this, the development of students' ethical GenAI literacy largely supports this interpretation. The students were guided to exercise caution and verify the outputs produced by the Generative AI tool for ethical reasons. As a result, significant improvements were observed in terms of critical behaviours, awareness of appropriate prompting, and critical examination of AI outputs. These findings address concerns regarding hallucinations, inaccurate information, overreliance, and reduced critical thinking, as supported by related literature [4, 6, 8].

The findings concerning communicative competence are broadly consistent with previous research [2, 13], particularly with regard to personalized practice, discipline-specific language in addition to oral and written skills. The development of students' abilities was evident in their capacity to articulate and justify their choices, present their lessons in a coherent manner, employ pertinent ESP terminology, maintain coherent communication, ask and answer questions, and engage in discussions with confidence. Nevertheless, the present study did not clearly address the change in listening and reading skills. It is imperative that this issue be accorded due consideration in future research.

Evidence of development in personalisation was also apparent, as demonstrated by students adapting their lessons to align with their ESP specialisation, levels of proficiency, and individual pace and preferences. This supports the potential of AI for personalized learning [9, 13], while also showing that personalization requires learners' identification of their needs and determining how to adapt materials accordingly.

Similarly, positive perceptions and increased self-confidence reported by students suggest that flexibility and continuous availability of the tool, combined with repeated practice, adapted materials, and adequate guidance from the teacher, supported students' learning experiences and self-regulated learning.

Nevertheless, it should be noted that all the observed enhancements reflect students' efforts, including proactive selection, adaptation, evaluation, and repeated practice, rather than being solely attributable to AI-generated tools. By following the teacher's instructions and using the Gemini Notebook ethically, students progressively shifted towards a more SRL approach.

Overall, the findings suggest that GenAI's value in ESP learning does not simply lie in providing students with access to an AI tool, but in the progressive guidance and transfer of its use to the learners themselves. The observed shift from reliance on direct prompts and teacher support to more intentional prompting, critical evaluation, adaptation, and reflection is indicative of a transition toward progressive 'weaning' from traditional learning models that are teacher-centred. This transition is characterised by a shift in the teacher's role from one of providing close guidance to one of facilitating students' independent decision-making, and fostering their responsibility for planning, monitoring, evaluating, and revising their learning. Hence, the findings support a teacher-mediated approach in which GenAI functions as a learning tool that can facilitate self-regulated ESP learning, provided that students acquire the skills to use it critically and independently.

6. Limitations

Several limitations should be considered when interpreting the findings of this study. First, the purposive sampling of third-year students from one faculty at a single university restricts the generalizability of the findings to other ESP environments. Also, the use of a single overall performance score, rather than separate scores for each dimension, limited the possibility of examining shifts in individual dimensions independently. Some findings relied on students' self-reports, which may fail to fully reflect their actual learning practices.

Another restriction concerns the reliance on a single GenAI tool, Gemini Notebook. As the intervention was built around this specific tool, the findings may not necessarily apply to other GenAI models or platforms. Finally, the present study did not specifically examine changes in participants' listening and reading skills. These aspects therefore warrant further attention in future interventions. Therefore, it is

imperative to interpret the findings within the context of the specific instructional and technological environment in which the study was conducted.

7. Conclusion

Generative artificial intelligence (GenAI) is changing the way students access information and learn languages. In ESP contexts, GenAI provides learners with a more flexible and personalized learning experience, gradually changing the traditional roles of teachers and learners. This study demonstrates that GenAI can support self-regulated learning, communication skills, personalized learning, and the responsible use of AI when carefully guided by the ESP teacher.

Rather than considering AI as an alternative to teachers' guidance, the study demonstrates its value as a critical learning resource. Through a process of gradual independence (or progressive weaning), teacher support is reduced as students take on more responsibility for selecting, adapting, evaluating, and revising AI-supported learning materials. Therefore, the findings suggest that a structured, teacher-guided approach can help to integrate GenAI into ESP, promoting learner autonomy and the ethical use of AI.

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