

**Promoting Learner Autonomy in German as a Foreign Language at the University; AI-Supported Scaffolding, Interactional Feedback, and Delegation – A Case Study at the University of Algiers 2**

**Favoriser l'autonomie des apprenants en allemand comme langue étrangère à l'université : rôle de l'étayage assisté par l'intelligence artificielle, de la rétroaction interactionnelle et de la délégation des apprentissages – étude de cas à l'Université d'Alger 2**

**Kouider OUICI\***

University of Algiers 2 (Algeria)

Kouider.ouici@univ-alger2.dz

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**Abstract**

Learner autonomy has become a key objective in contemporary higher education, especially in foreign language learning. In German as a Foreign Language (GFL) contexts, it is essential for enabling learners to regulate their learning, monitor progress, and sustain long-term language development. With the rapid advancement of digital technologies and artificial intelligence (AI), new pedagogical opportunities have emerged to support autonomy in technology-enhanced learning environments.

This study examines the role and effectiveness of three pedagogical strategies—scaffolding, interactional feedback, and delegation—within AI-supported learning

environments in GFL courses at the University of Algiers 2. A mixed-methods approach is employed, combining quantitative data from structured questionnaires with qualitative insights from an open-ended question.

The findings indicate that AI can significantly enhance learner autonomy in higher education when its use is guided by sound pedagogical principles and effective teacher mediation. However, the study also highlights the importance of digital literacy and pedagogical orchestration to ensure meaningful integration of AI tools. Overall, the research contributes to international discussions on AI-assisted language learning and offers practical implications for designing technology-enhanced GFL instruction at university level.

**Keywords**

Learner autonomy; artificial intelligence; scaffolding; interactional feedback; delegation; German as a Foreign Language; higher education.

**Résumé**

L'autonomie des apprenants est devenue un objectif central de l'enseignement supérieur contemporain, en particulier dans l'apprentissage des langues étrangères. Dans le contexte de l'allemand langue étrangère (ALE), elle est essentielle pour permettre aux apprenants de réguler leurs apprentissages, de suivre leurs progrès et d'assurer un développement linguistique durable. Avec l'essor rapide des technologies numériques et de l'intelligence artificielle (IA), de nouvelles opportunités pédagogiques se sont développées pour soutenir l'autonomie dans des environnements d'apprentissage enrichis par la technologie.

Cette étude examine le rôle et l'efficacité de trois stratégies pédagogiques — l'étayage, la rétroaction interactionnelle et la délégation — dans des contextes d'apprentissage soutenus par l'IA dans des cours d'allemand langue étrangère à

l'Université d'Alger 2. Une approche méthodologique mixte est adoptée, combinant des données quantitatives issues de questionnaires structurés et des données qualitatives recueillies à partir d'une question ouverte.

Les résultats montrent que l'intelligence artificielle peut contribuer de manière significative au développement de l'autonomie des apprenants dans l'enseignement supérieur, à condition que son utilisation repose sur des principes pédagogiques solides et une médiation enseignante efficace. Toutefois, l'étude souligne également l'importance de la littératie numérique et de l'orchestration pédagogique pour garantir une intégration pertinente des outils d'IA. Dans l'ensemble, cette recherche contribue aux débats internationaux sur l'apprentissage des langues assisté par l'IA et propose des implications pédagogiques concrètes pour la conception de l'enseignement de l'allemand langue étrangère à l'université.

### **Mots-clés**

Autonomie des apprenants ; intelligence artificielle ; étayage ; rétroaction interactionnelle ; délégation ; allemand langue étrangère ; enseignement supérieur.

\*Corresponding Author:

## **1. Introduction**

Learner autonomy is a key principle in modern foreign language education (Holec, 1981). In higher education, students are expected to take responsibility for their own learning by planning strategies, monitoring progress, and evaluating outcomes (Benson, 2011; Zimmerman, 2002). This shift from teacher-centered to learner-centered approach reflects a broader emphasis on self-regulated learning and lifelong learning skills.

In German as a Foreign Language (GFL), autonomy is especially important due to the complexity of grammar, vocabulary, and cultural aspects, as well as limited opportunities for real-life language exposure in contexts such as the University of Algiers 2. Therefore, independent learning plays a crucial role in successful language acquisition (Ellis, 2008; Chapelle, 2021). Recent developments in artificial intelligence offer new possibilities to support autonomous learning through tools such as intelligent tutoring systems, chatbots, and automated feedback systems (Luckin et al., 2016; Lee, 2022). These tools provide individualized support and encourage self-paced learning in low-anxiety environments.

However, it remains important to examine how AI can support autonomy without replacing meaningful learning processes (Dam, 2023). This study investigates three strategies—scaffolding, interactional feedback, and delegation—in AI-supported learning environments at the University of Algiers 2.

The study aims to:

1. Examine AI scaffolding for grammar and vocabulary learning.
2. Analyze AI feedback for error correction and self-monitoring.
3. Investigate task delegation and independent learning.
4. Evaluate AI's impact on learner autonomy.
5. Relate findings to international research.

## **2. Literature Review**

### **2.1 Learner Autonomy in Language Education**

The concept of learner autonomy has been extensively theorized within the field of language education over the past decades. One of the most influential conceptualizations was proposed by Henri Holec, who defined learner autonomy as the ability to take charge of one's own learning (Holec, 1981). This perspective

emphasizes learners' capacity to determine learning objectives, select appropriate strategies, monitor their progress, and evaluate learning outcomes.

Subsequent scholarship has expanded this notion to encompass cognitive, metacognitive, motivational, and social dimensions. Benson, for instance, conceptualizes learner autonomy not as isolated self-study but as a dynamic and socially mediated process that emerges through interaction among learners, teachers, and learning environments (Benson, 2011). From this standpoint, autonomy is cultivated through guided participation, reflective practice, and pedagogical support rather than through complete independence (Benson, 2011; Little, 2007).

In higher education, the development of learner autonomy is of particular importance, as students are expected to engage in self-regulated learning beyond the classroom. Autonomous learners typically exhibit higher levels of intrinsic motivation, greater strategic flexibility, and enhanced capacity to cope with complex academic challenges (Zimmerman, 2002; Oxford, 2017). Within foreign language learning, autonomy is closely linked to authentic communication, exposure to meaningful input, and reflective engagement with language use. Learners who actively regulate their learning processes are more likely to engage in extensive reading, independent vocabulary acquisition, and sustained language practice (Krashen, 1985; Benson, 2011). Consequently, learner autonomy has become a fundamental objective of contemporary language pedagogy.

## **2.2 Scaffolding in Language Learning**

The concept of scaffolding is rooted in socio-cultural theory, particularly in the work of Lev Vygotsky and subsequent contributions by Wood, Bruner, and Ross (Wood et

al., 1976; Vygotsky, 1978). Scaffolding refers to the temporary and adaptive support provided by a more knowledgeable other to enable learners to perform tasks beyond their current level of competence.

A defining characteristic of scaffolding is the gradual withdrawal of support as learners develop increasing proficiency (Wood et al., 1976). Initially, learners benefit from explicit guidance, structured input, and step-by-step assistance. As their competence grows, this support is progressively reduced, allowing learners to assume greater responsibility for task completion. In language learning contexts, scaffolding can manifest in various forms, including linguistic modeling, guided questioning, structured tasks, and strategic prompting (Wood et al., 1976; Donato, 1994). These forms of support help learners bridge the gap between their current level of performance and the desired target competence.

The emergence of digital technologies has considerably expanded the scope of scaffolding in language education. AI-driven systems can provide adaptive tasks, personalized feedback, and context-sensitive prompts tailored to individual learners' needs (Luckin et al., 2016; Heift & Schulze, 2007). Such AI-supported scaffolding enables continuous and immediate support while preserving learner agency. As a result, it facilitates more individualized, flexible, and responsive learning processes.

### **2.3 Interactional Feedback in Language Learning**

Interactional feedback constitutes a central component of second and foreign language acquisition (Lyster & Ranta, 1997). It encompasses responses to learners' linguistic output that aim to draw attention to errors and promote language development.

Research has identified various types of feedback, including explicit correction, recasts, clarification requests, metalinguistic feedback, and elicitation (Lyster & Ranta, 1997). Each type serves to highlight linguistic inaccuracies while maintaining communicative engagement.

In traditional classroom environments, feedback is typically provided by teachers or peers during communicative activities. However, recent advances in artificial intelligence have introduced new modalities of feedback delivery (Lee, 2022; Chapelle, 2021).

AI-based tools—such as automated writing evaluation systems, grammar correction software, and conversational agents—can analyze learners' language production and provide immediate corrective input. This immediacy allows learners to identify and address errors in real time, thereby enhancing the efficiency of the learning process (Burston, 2015; Lee, 2022). Moreover, the frequency and consistency of AI-generated feedback can foster metacognitive awareness and support reflective learning practices (Luckin et al., 2016). Through repeated exposure to corrective input, learners develop increased sensitivity to linguistic patterns, grammatical accuracy, and discourse conventions.

#### **2.4 Delegation and Responsibility in Learning**

Delegation represents a crucial pedagogical mechanism for fostering learner autonomy. In educational contexts, delegation refers to the systematic transfer of responsibility for learning tasks from the instructor to the learner (Benson, 2011).

In language education, delegation may take the form of student-led presentations, project-based learning, peer instruction, and independent research activities. Such

practices require learners to plan, organize, and evaluate their own learning processes (Dam, 2023; Ellis, 2008).

Delegation is closely associated with learner motivation and engagement. When students are entrusted with responsibility, they are more likely to demonstrate commitment, initiative, and active participation (Benson, 2011).

In technology-enhanced learning environments, delegation can be effectively supported through digital tools and AI-based systems. Learners may engage independently with adaptive platforms, conduct research using digital resources, or participate in online collaborative tasks (Luckin et al., 2016). These technologies provide structured support while simultaneously promoting autonomy. The integration of delegation with technological support thus creates a balanced pedagogical framework in which learners develop independence while still benefiting from guided instruction.

### **3. Methodology**

This study employed a mixed-methods research design, utilizing a Google Forms questionnaire that combined multiple-choice questions with an open-ended question to explore the impact of AI-supported learning in German as a Foreign Language (GFL) courses at the University of Algiers 2. The approach enabled the collection of both measurable data and in-depth student perspectives. The primary objective of this study was to examine how AI tools support scaffolding, interactional feedback, task delegation, and learner autonomy. More specifically, the study investigated the extent to which AI enhances grammar and vocabulary acquisition, facilitates error correction and self-monitoring, promotes independent task completion, and strengthens learners' responsibility for their own learning.

The study involved 108 undergraduate students with proficiency levels ranging from A2 to B2 (CEFR). Participants had prior experience with digital and AI-supported learning tools.

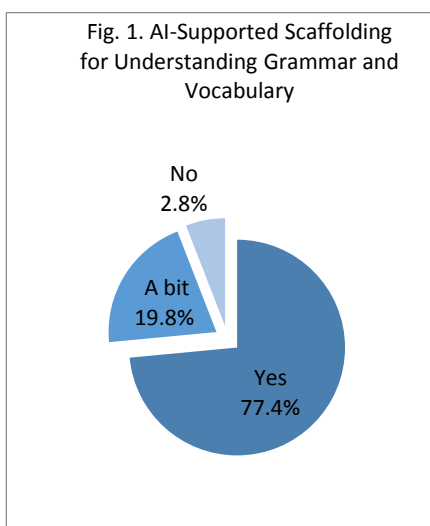
Data were collected by Google Forms questionnaire, consisting of seven items rated on a three-point scale ("Yes," "A bit," "No"), along with one open-ended question. Quantitative data were analyzed using descriptive statistics, while qualitative responses were examined through thematic analysis. The AI tools used—including ChatGPT, Duolingo for Schools, LingQ, Grammarly, and WriteLab—provided interactive support, personalized learning, and immediate feedback.

## 4. Results

### 4.1 Quantitative Results

#### 4.1.1 Scaffolding: Understanding Grammar and Step-by-Step Support

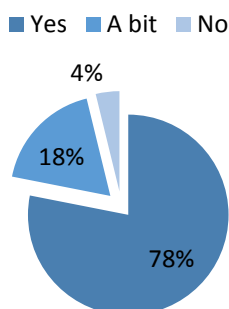
The analysis of the questionnaire shows that AI-supported scaffolding was highly



effective for most students. A total of 82 out of 108 respondents (77.4%) indicated that AI tools helped them understand difficult grammar and new vocabulary. 21 students (19.8%) reported partial support, while only 3 students (2.8%) felt that AI did not help them in this regard.

Regarding step-by-step support, 69 students (65.1%) confirmed that AI tools guided them through tasks systematically, 31 students (29.2%) reported partial support, and 6 students (5.7%) responded negatively. These results demonstrate that AI scaffolding facilitates comprehension and structured learning, providing clear guidance that reduces anxiety and cognitive load.

Fig. 2. AI-Guided Step-by-Step Support in Task Completion



#### 4.1.2 Interactional Feedback: Error Detection and Text Improvement

Interactional feedback was perceived as highly effective. A majority of students (82 out of 108, 78.1%) reported that AI tools helped them detect errors in their German sentences, with only four students responding negatively.

Fig. 3. Effectiveness of AI in Error Detection in German Writing

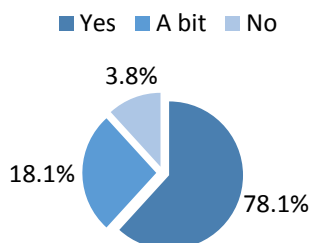
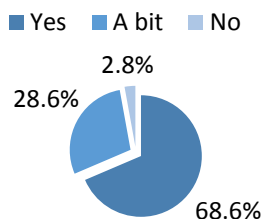


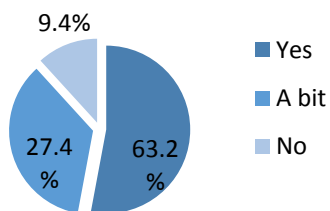
Fig. 4. Perceived Improvement of Written Production through AI Feedback



The results show that AI-supported feedback was predominantly evaluated positively by the students. Out of 105 respondents, 72 students (68.6%) stated that the AI feedback fully helped them improve their German texts or sentences. An additional 30 students (28.6%) reported that it partially helped them, while only 3 students (2.8%) indicated no benefit.

These findings suggest that AI feedback has a high level of effectiveness in promoting writing competence in German as a Foreign Language (GFL) instruction.

Fig. 5. AI Support for Independent Task Completion (Delegation)



#### 4.1.3 Promotion of Independent Task Completion

Regarding the independent completion of tasks in the German course, the results show a more mixed picture. Out of 106 participants, 67 students (63.2%) reported that AI tools fully

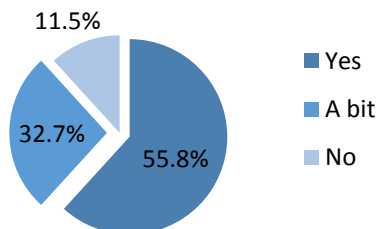
helped them complete tasks independently. 29 students (27.4%) selected “a little,” while 10 students (9.4%) reported no benefit.

This suggests that AI tools strengthen learner autonomy for many students; however, they are not equally effective for all learners.

#### 4.1.4 Promotion of Learner Responsibility through AI Tools

Regarding the assumption of responsibility for one’s own German learning, the data also show

Fig. 6. Impact of AI Tools on Learner Autonomy and Responsibility



a positive trend. 58 students (55.8%) reported that AI tools fully helped them take more responsibility for their learning. 34 students (32.7%) indicated partial support, while 12 students (11.5%) reported no influence.

Overall, it can be concluded that AI tools make a moderate to strong contribution to fostering learner autonomy and self-responsibility.

## **4.2 Qualitative Results**

### **4.2.1 Improved Understanding of Grammar and Vocabulary**

The open-ended responses highlighted that AI tools supported students' comprehension of grammar and vocabulary. Many students reported that AI explanations clarified complex concepts and provided accessible examples, making learning more manageable and efficient.

### **4.2.2 Error Correction and Immediate Feedback**

Students consistently noted the value of immediate feedback. AI tools allowed them to identify and correct mistakes promptly, which reinforced learning and increased linguistic accuracy. This immediate feedback was seen as a key factor in improving both writing and sentence construction.

### **4.2.3 Increased Learning Speed and Efficiency**

Many respondents reported that AI-enabled tools accelerated their learning. Students could practice independently, receive instant explanations, and learn new words and structures more quickly, which improved engagement and confidence in language use.

### **4.2.4 Development of Learner Autonomy**

Students emphasized that AI tools supported independent learning, allowing them to complete tasks on their own and take greater responsibility for their progress. The

tools enabled self-directed practice, promoting a sense of ownership over the learning process.

#### **4.2.5 Challenges and Critical Perspectives**

Some students expressed concerns about over-reliance on AI. They noted that excessive use could reduce independent thinking, and occasional AI errors highlighted the ongoing need for teacher mediation. These observations underscore the importance of balancing AI support with guided instruction.

### **7. Interpretation**

#### **7.1 AI-Supported Scaffolding in Grammar and Vocabulary Learning**

The results of the study clearly indicate that AI-supported scaffolding plays a central role in facilitating grammar and vocabulary acquisition among GFL learners. A substantial majority of students (77.4%) reported that AI tools helped them understand complex grammatical structures and new lexical items, while 19.8% experienced partial support and only 2.8% reported no benefit. This distribution demonstrates that AI tools are highly effective in making abstract linguistic content more accessible to learners at intermediate proficiency levels (A2–B2). The data suggest that AI systems function as cognitive mediators by simplifying complex input, providing contextualized explanations, and offering immediate clarification when learners encounter difficulties. Consequently, AI tools reduce cognitive load and enable more efficient processing of linguistic information.

A similarly strong pattern emerges in relation to step-by-step learning support. Here, 65.1% of students confirmed that AI tools guided them systematically through tasks, while 29.2% reported partial support and only 5.7% expressed negative responses. This indicates that AI tools not only support understanding but also contribute to the structuring of learning processes. From an interpretative perspective, AI functions as

a dynamic scaffolding system that enables learners to progress through tasks in a guided and structured manner. This structured support is particularly significant in foreign language learning, where learners must simultaneously manage multiple cognitive demands such as grammar, vocabulary, and meaning construction.

### **7.2 Interactional Feedback and Writing Development**

The findings further demonstrate that AI-based interactional feedback is perceived as highly effective in improving learners' writing competence. A strong majority of students (78.1%) reported that AI tools helped them identify errors in their German sentences, while only a minimal proportion expressed dissatisfaction. In addition, 68.6% of respondents stated that AI feedback fully improved their writing, 28.6% reported partial improvement, and only 2.8% indicated no benefit.

These results suggest that AI feedback operates on two interconnected levels. First, it provides immediate surface-level error detection, enabling learners to become aware of grammatical, lexical, and syntactical mistakes in real time. Second, it contributes to deeper learning by supporting the development of writing competence over time. The high percentage of positive responses indicates that learners not only correct errors but also gradually internalize linguistic structures through repeated feedback cycles. This aligns with principles of formative feedback, which emphasize the importance of immediacy and repetition in promoting language acquisition.

### **7.3 AI and Independent Task Completion**

The results concerning independent task completion reveal a generally positive but more differentiated picture compared to scaffolding and feedback. A total of 63.2% of students reported that AI tools fully supported them in completing tasks independently, while 27.4% indicated partial support and 9.4% reported no benefit.

These findings suggest that AI tools contribute significantly to fostering learner autonomy, although their impact is not uniform across all learners.

This variation may be explained by differences in digital competence, learning strategies, and levels of dependency on AI systems. While some learners are able to use AI tools effectively to support self-directed learning, others may struggle to fully integrate these tools into independent learning processes. In this sense, AI does not automatically produce autonomy but rather facilitates a gradual development of independent learning skills. Therefore, AI should be interpreted as a mediating tool that supports guided independence rather than full self-sufficiency.

#### **7.4 Learner Responsibility and Self-Regulated Learning**

The findings also show that AI tools have a positive but moderate impact on learner responsibility. More than half of the participants (55.8%) reported that AI tools helped them take greater responsibility for their learning, while 32.7% experienced partial support and 11.5% reported no influence. These results suggest that AI contributes to the development of self-regulated learning behaviors, although its effect is less pronounced than in other dimensions such as scaffolding and feedback. This pattern indicates that learner responsibility is a more complex construct that depends not only on technological support but also on motivational, pedagogical, and contextual factors. AI tools appear to encourage learners to monitor their own progress and engage more actively with learning tasks; however, the development of full responsibility requires additional support from teachers and institutional frameworks. Thus, AI plays a facilitating role in promoting awareness and reflection, but it does not fully determine the level of learner responsibility.

### 7.5 Qualitative Insights into Learning Processes

The qualitative data complement the quantitative findings by providing deeper insight into learners' experiences with AI tools. Students consistently reported that AI systems simplify complex grammatical explanations and make vocabulary learning more accessible. This suggests that AI functions as a cognitive support system that translates difficult linguistic input into understandable forms, thereby enhancing learning efficiency. Furthermore, students emphasized the importance of immediate feedback, which allowed them to detect and correct errors instantly. This real-time correction process was perceived as particularly beneficial for improving writing accuracy and sentence construction. Many learners also reported that AI tools increased their learning speed and efficiency by enabling independent practice and providing instant explanations.

Another key finding is the perceived development of learner autonomy. Students stated that AI tools allowed them to complete tasks independently and take greater control over their learning process. However, despite these advantages, some learners expressed concerns about over-reliance on AI. They warned that excessive dependence may reduce critical thinking skills and highlighted occasional inaccuracies in AI-generated responses. These critical perspectives underscore the need for a balanced integration of AI tools in language education, where technology supports but does not replace human instruction.

## 8. Discussion

The findings of this study provide strong evidence that AI-supported learning tools significantly enhance German as a Foreign Language (GFL) learning at the University of Algiers 2. The results must be interpreted in relation to key dimensions of second

language acquisition, particularly scaffolding, feedback, learner autonomy, and learner responsibility.

### **8.1 AI as a Cognitive Scaffold**

The high percentages in scaffolding (77.4% understanding improvement; 65.1% structured support) indicate that AI tools function as effective cognitive scaffolds. In line with Vygotsky's Zone of Proximal Development (ZPD), AI helps learners bridge the gap between independent and assisted performance by simplifying complex grammar and guiding learning step by step. This reduces cognitive load and supports more structured language acquisition.

### **8.2 AI-Driven Feedback and Writing Development**

The results also confirm the strong effectiveness of AI-based feedback (78.1% error detection; 68.6% writing improvement). AI provides immediate and continuous corrective feedback, which supports formative learning processes and helps learners gradually internalize linguistic structures. This enhances both accuracy and writing development, while complementing rather than replacing teacher feedback.

### **8.3 AI and Learner Autonomy**

Findings on autonomy are more differentiated (63.2% independent task completion; 55.8% responsibility increase). While AI supports independent learning, its impact varies across learners due to differences in digital literacy, motivation, and learning strategies. Therefore, AI should be understood as a facilitator of guided independence rather than a direct generator of full autonomy.

#### 8.4 Pedagogical Implications and Limitations

The study highlights the importance of integrating AI as a complementary tool within a blended learning model, where teachers remain central for guidance and validation. At the same time, concerns about over-reliance and occasional AI inaccuracies underline the need for critical use and digital literacy training. The reliance on self-reported data and the specific institutional context may limit generalizability.

#### 9. Conclusion

This study investigated the impact of AI-supported learning tools on German as a Foreign Language (GFL) learners at the University of Algiers 2, focusing on scaffolding, feedback, learner autonomy, and responsibility.

The findings demonstrate that AI tools have a strong positive impact on key dimensions of language learning. Specifically, the data show that:

- 77.4% of students improved their understanding of grammar and vocabulary through AI-supported scaffolding,
- 78.1% benefited from AI-based error detection,
- 68.6% experienced improved writing performance,
- 63.2% were able to complete tasks independently with AI support,
- and 55.8% reported increased responsibility for their learning.

These results confirm that AI tools significantly enhance learning processes, particularly in providing structured guidance and immediate feedback. However, the findings also reveal that the development of deeper competencies such as autonomy and responsibility is more variable and depends on individual learner differences.

In conclusion, AI-supported learning represents a powerful pedagogical innovation in foreign language education. Its most effective role is as a complementary instructional tool that enhances teacher-led instruction rather than replacing it. For optimal results, AI integration should be accompanied by pedagogical guidance, learner training in digital literacy, and a balanced instructional design that fosters both support and independence. Ultimately, the study highlights the importance of a hybrid educational model, where AI technologies and human teaching work together to create more efficient, interactive, and learner-centered language learning environments.

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