The Impact of ChatGPT on Students' Self-directed Foreign Language Learning

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Abstract: The integration of Generative Artificial Intelligence (GenAI) technologies into educational environments has become an important area of research. The potential of GenAI to support traditional learning methods by offering opportunities for personalized and self-directed learning is substantial. This study aims to empirically assess the effectiveness of ChatGPT as a learning support tool in undergraduate French language classes. Various assessment methods were used, such as multiple choice tests, essays, and direct communication. Additionally, interviews were conducted to gather further insight. The average post-test scores of students in the experimental group increased significantly, supporting the hypothesis that ChatGPT enhances grammar learning. The integration of ChatGPT in education, particularly in foreign language teaching, demonstrates tangible benefits in enhancing learning outcomes and fostering self-directed learning. ChatGPT has a positive impact on students' SDL abilities, making them more engaged and autonomous in their foreign language learning process. It differentiates the technology-enhanced learning approach from traditional methods. Further empirical evaluation is recommended to gain deeper insights into ChatGPT's impact on education and training.

Keywords: ChatGPT, grammar learning, self-directed learning.

Subject classification: Education.

1. Introduction

The integration of technology into teaching and learning has become a critical trend in contemporary education (Hong, 2023). Since its development, Generative AI tools like ChatGPT and Midjourney have garnered significant

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attention from education experts due to the ability to generate texts, documents, and images with a quality comparable to that produced by humans (Fauzan et al., 2023; Sefriani et al., 2022). These capabilities offer tremendous potential for education, particularly in promoting computational thinking, creativity, and critical thinking among learners (Lin, 2023; van den Berg & Du Plessis, 2023; Yilmaz & Karaoglan Yilmaz, 2023). In this study, we aim to assess the impact of ChatGPT on students' self-directed foreign language learning, focusing on two key aspects: grammar learning performance and self-directed learning (SDL).

In the context of globalization, multilingual proficiency has become increasingly important, significantly affecting individual success in both career and life. Language learning not only helps to develop communication and cross-cultural collaboration skills but also expands horizons and provides access to new knowledge (Knowles, 1970). To meet these demands, many higher education institutions today offer diverse language training programs, while also applying advanced teaching methods and technologies such as communicative language teaching, task-based language learning, and computer-assisted language learning (Chong & Reinders, 2020; Nguyen et al., 2015; Parmaxi & Demetriou, 2020).

Although the role of ChatGPT in improving language skills (listening, speaking, reading, and writing) has been discussed in some studies, there is still a lack of specific research on the impact of this tool on grammar learning, a core component of foreign language acquisition. This is particularly important in the context of Asian countries such as Vietnam, China, and the Republic of Korea, or South Korea, where grammar instruction in foreign language training remains a focus (Rahardjo & Pertiwi, 2020; Safitri et al., 2021; Kim, 2019). Additionally, self-directed learning (SDL) - the ability for learners to set their own goals and evaluate their progress (Rathore & Chopra, 2020) - is becoming increasingly valued (Ali, et al. (2023). Chatbot tools like ChatGPT are expected to support students in developing SDL skills by encouraging independent learning (Han et al., 2022).

Based on these observations, we conducted an experimental study with students learning French at a university in Vietnam to answer the following research questions:

- **Question 1:** How does the integration of ChatGPT affect university students' French grammar learning?
- **Question 2:** How does the integration of ChatGPT affect university students' self-directed learning?

This study contributes to a deeper understanding of how AI tools like ChatGPT can enhance language learning outcomes and promote students' SDL skills. The key contributions of this research include:

- An empirical evaluation of the role of ChatGPT in improving language and grammar skills in a real-world classroom environment;

- An investigation into the impact of ChatGPT on students' ability to manage and direct their own learning.

2. Literature review

ChatGPT, developed by OpenAI in recent years, is one of the pioneering tools in the field of Generative AI (GenAI). ChatGPT operates based on deep learning for Natural Language Processing (NLP), specifically the Generative Pre-trained Transformer (GPT) model, with the ability to generate text responses that closely resemble natural human language. This AI tool can produce new content in various forms (e.g., essays, jokes, poems) based on a large linguistic database. Its continuous intake of user input allows ChatGPT to improve its performance in similar tasks, such as answering repeated questions.

In education, especially in language teaching, ChatGPT has quickly become a topic of interest among researchers. Wilson (2023) discussed ChatGPT's potential as a personal language tutor, although the study did not provide experimental evaluations. Shaikh et al. (2023) applied ChatGPT in formal English language instruction for university students in Norway, emphasizing the tool's effectiveness in expanding vocabulary, correcting grammatical structures, and improving writing and communication skills. In South Korea, Kim (2019) examined how AI chatbots helped improve English grammar skills among students, highlighting the importance of active participation and continuous error correction. Additionally, ChatGPT has been studied as a tool that supports task-based language teaching (TBLT), particularly in lesson design (Kim et al., 2023). Yan (2023) conducted experiments on ChatGPT's text generation feature during a second-language writing skills course, showing the tool's significant potential in language teaching. However, the study also pointed to concerns about academic integrity and fairness in education, calling for management policies and pedagogical guidelines to ensure the responsible use of AI in education.

In Vietnam, a study by Tran Tin Nghi, Tran Huu Phuc, Nguyen Tat Thang (2019) involving 200 foreign language students was conducted to compare the learning experience through chatbots with traditional methods. The results showed that chatbots were highly regarded for their flexibility and ability to provide rich learning resources (Tran Tin Nghi, Tran Huu Phuc, Nguyen Tat Thang, 2019). Another study at a college in Hanoi explored the use of AI chatbots in improving pronunciation among vocational students, showing significant improvements in learning outcomes (Hoang Ngoc Tue, Duong Ngoc Han, Le Duc Hanh, 2023). Dao Xuan Quy et al. (2023) examined ChatGPT's capability in answering English exam questions from Vietnam's National High School Graduation Examination, finding that the tool demonstrated a high and consistent accuracy rate across different difficulty levels but faced challenges with context-based or pronunciation-related questions.

Although many studies have discussed the potential of using ChatGPT as a personal tutor and its application in teaching basic language skills, most have focused on English and often lack empirical data. The novelty of our research lies in providing empirical evidence of ChatGPT's effectiveness in teaching French grammar, a language with a community of nearly 90 member and observer countries worldwide. Additionally, we clarify the role of this GenAI tool in supporting Vietnamese students' SDL, an aspect that has not been deeply explored before.

The concept of "self-directed learning" (SDL) has been theoretically debated, but it has rarely been systematically implemented in adult education (Loeng, 2020). Many researchers have compared SDL with teacher-directed learning to develop adult learners' self-study skills. SDL is associated with empowering learners to set their own goals and take responsibility for their learning process, both in formal and informal learning environments. In this context, teachers act as observers, supporters, and facilitators for learners (Knowles, 1975; Kerka, 1994; Van der Walt, 2019). SDL is not merely a set of techniques but it involves a deeper internal change in learners' perspectives (Chené, 1983; Brookfield, 1985). This concept also relates to self-access learning, where learners actively choose and utilize resources to serve their learning goals. Those with strong language learning skills often demonstrate SDL abilities, even under limited access to learning resources (Griffiths, 2008; Rubin & Thompson, 1994).

SDL has been shown to positively influence learners by enhancing their motivation and effectiveness in applying knowledge to daily life (Knowles, 1975). Self-directed learners feel more autonomous and successful compared to those who rely on teacher-directed learning (Suanmali, 1981). This method can improve learning outcomes and promote lifelong learning (Garrison, 1997). Kuhn and Ho (1980) suggested that SDL enhances cognitive development. In contrast, focusing too much on external control may lead to a "directionless intellectual journey for learners" (Pratt, 1993). In higher education, the shift in the teacher's role from decision-maker to learning facilitator is becoming increasingly important, necessitating changes in curriculum design. This shift requires increased student activity and responsibility for their learning, making SDL a suitable foundation for this transformation (Loeng, 2020). It is important to note that, while adults are often viewed as having natural self-directed learning abilities, this should be seen as an educational goal to be achieved, not an inherent trait. Effective SDL requires going through a process of "learning to learn" (Adenuga, 1989).

Based on the literature review, we formulated the following null (Ho) and alternative (Halt) hypotheses using two approaches:

Having a strong command of grammar is essential for language proficiency, and the advanced language models in ChatGPT have the potential to help users

effectively identify and correct errors. Based on this premise, we propose the following hypotheses:

- H1o: There is no difference in French grammar proficiency between the experimental group, supported by ChatGPT, and the control group.
- H1alt: There is a difference in French grammar proficiency between the experimental group, supported by ChatGPT, and the control group.

Additionally, ChatGPT has the ability to enhance self-directed learning by providing a personalized learning experience tailored to individual needs. Therefore, our second hypothesis is:

- H2o: There is no difference in self-directed learning ability between the experimental group, supported by ChatGPT, and the control group.
- H2alt: There is a difference in self-directed learning ability between the experimental group, supported by ChatGPT, and the control group.

3. Methodology

3.1. Research Design

As shown in Figure 1, students participating in this study were divided into two groups: the experimental group (ChatGPT group - CG) and the control group (Traditional group - TG). A quasi-experimental research design using pre-/post-tests was applied to examine the impact of ChatGPT on the French grammar learning of university students. Unlike true experimental designs that require random group assignment, quasi-experimental designs use existing groups or conditions to analyze relationships between variables (Campbell & Stanley, 2015; Baharom et al., 2020).

The pre-test was conducted to assess students' initial grammar proficiency and SDL ability, while the post-test measured learning outcomes and SDL abilities after the experiment. The comparison of results from the two tests reveals the extent to which ChatGPT influenced grammar learning performance and SDL.

During the course, both the experimental and control groups followed the same content and study duration, under the guidance of the same instructor. The only difference was the teaching method: the experimental group (CG) used ChatGPT as the primary learning tool, while the control group (TG) adhered to traditional teaching methods, including lectures, presentations, and note-taking. Grammar topics were taught in a sequence of discovery, understanding, memorization, and application through exercises and specific scenarios.

ChatGPT version 3.5, a free version widely available from OpenAI, was used in this study.

Figure 1: Research Approach and Setting
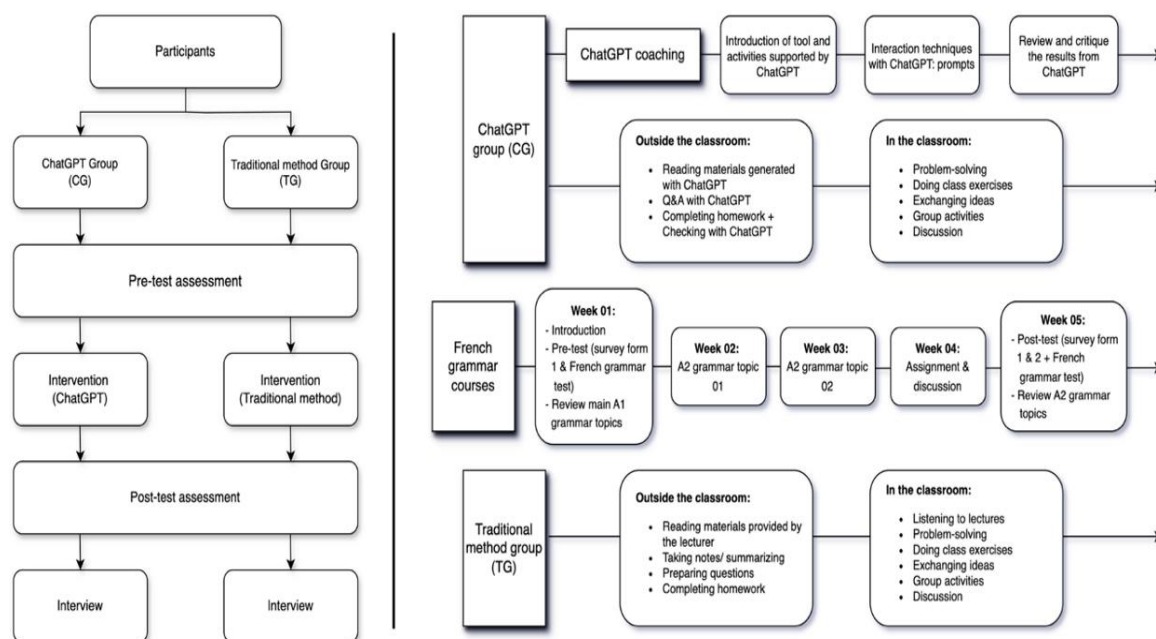
3.2. Participants

This study focused on French language students at the University of Transport and Communications (Hanoi), with an A1 level according to Vietnam's Six-level Foreign Language Proficiency Framework, progressing to A2 level. A total of 41 engineering students, primarily male, participated in the study, and they were informed of the research purpose and agreed to participate.

3.3. Research Instruments

The instrument used for the pre- and post-tests was a 30-minute French grammar test, designed on the Test de Connaissance du Français (TCF) format, consisting of 30 multiple choice and short-answer questions. This format is currently used in the French program at the University, allowing students to focus more easily on test content. Additionally, a survey consisting of six Likert-scale questions (from 1 - strongly disagree to 5 - strongly agree) was implemented to assess students' experiences of learning grammar with ChatGPT.

To measure SDL, the survey by Shen et al. (2014) was used, which was also evaluated on a 5-level Likert scale. The responses were collected and managed through Google Forms. Throughout the five-week course, both groups had regular French classes for six hours per week. The experimental group (CG) was given additional guidance on using ChatGPT for learning French grammar. The weekly schedule is illustrated in Figure 1.

The flipped classroom approach was applied to the experimental group to encourage students to actively use ChatGPT for asking questions, engaging in conversations, and discussing topics in French (or Vietnamese with translation) to prepare lessons before participating in group discussions. The instructor provided both academic and technical support for communicating with ChatGPT. Meanwhile, students in the control group (TG) followed traditional learning methods, including reviewing provided materials, attending lectures, and participating in group discussions in class. After the course was completed, interviews were conducted to gather additional information on the learning experiences of both groups.

Table 1: Interviewee Profile

No	Person ID	Age	Group	French grammar level	ChatGPT experience
1	Interview 1 (I.01)	19	CG	A1	Daily usage
2	Interview 2 (I.02)	19	CG	A1	Less than 3-4 times per month
3	Interview 3 (I.03)	18	CG	A1	Daily usage
4	Interview 4 (I.04)	18	CG	A1	Daily usage
5	Interview 5 (I.05)	20	TG	A1	Weekly usage
6	Interview 6 (I.06)	18	TG	A1	Only try a few times

3.4. Reliability and Validity of Instruments

To ensure the validity and reliability of the research instruments, the pre- and post-test questions were designed based on the A1 and A2 grammar topics taught in the French program at the University of Transport and Communications.

The surveys were confirmed to be reliable using Cronbach's Alpha, with data analyzed using SPSS 26.0. The collected data was analyzed through t-tests with a significance level of 0.05 to compare the grammar learning performance and SDL abilities between the groups. Additionally, both quantitative and qualitative methods were combined to enhance the overall reliability and validity of the research.

4. Research Results

4.1. Improvement in French grammar learning

A t-test was conducted to assess the change in French grammar proficiency between the two student groups. Levene's test confirmed equal variances, allowing the use of standard t-tests, with significance values for both the pre- and post-tests exceeding 0.05. The pre-test results indicated no significant difference between the groups (sig. 2-tailed > 0.05). However, the post-test results revealed a statistically

significant difference, with a sig. 2-tailed value of less than 0.05, demonstrating the impact of using ChatGPT on the experimental group.

Figure 2 shows that the experimental group (CG) achieved an average score of 2.94, while the control group (TG) scored an average of 2.34, indicating that ChatGPT positively influenced French grammar learning.

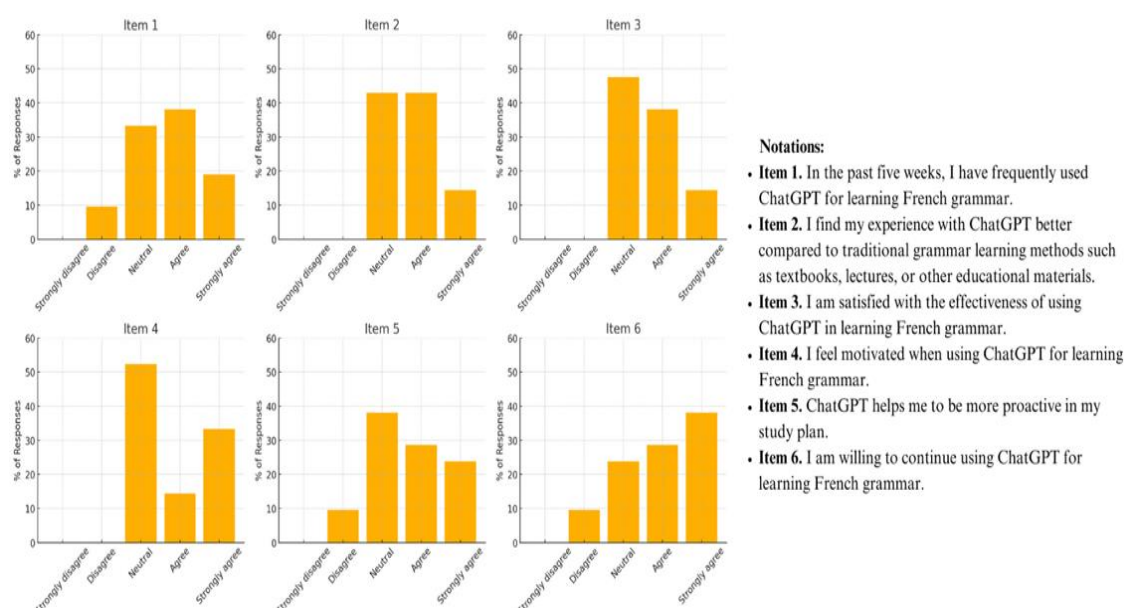**Figure 2:** T-test for Comparing Pre-test and Post-test Score

Independent Samples Test		Levene's Test		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
French grammar (pre-test)	Equal variances assumed	0.19	0.67	1.85	39.00	0.07	0.74
	Equal variances not assumed			1.86	37.67	0.07	0.74
French grammar (post-test)	Equal variances assumed	0.99	0.32	3.40	39.00	0.00**	1.27
	Equal variances not assumed			3.43	35.86	0.00**	1.27
Notation: *: p value < 0.05, **: p value < 0.01							

Paired Samples Test		Paired Differences				
Group		Mean	SD	T	df	Sig. (2-tailed)
CG	French grammar (post-test) - French grammar (pre-test)	2.94	1.50	8.95	20	0.00**
TG	French grammar (post-test) - French grammar (pre-test)	2.34	0.60	17.92	19	0.00**
Notation: *: p value < 0.05, **: p value < 0.01						

To further understand ChatGPT's role in the CG group's learning process, a survey consisting of six questions (Survey 02) was conducted at the end of the course. The Cronbach's Alpha for this survey was 0.868, indicating high reliability.

The survey results, presented in Figure 3, show that 57.2% of students found that learning with ChatGPT was better than traditional methods, and 52.4% agreed that ChatGPT was effective in supporting French grammar learning. Notably, 66.7% of students expressed a desire to continue using ChatGPT as a learning tool in the future.

Figure 3: Questions of Survey Form 02 for CG Students

Notations:
- Item 1. In the past five weeks, I have frequently used ChatGPT for learning French grammar.
- Item 2. I find my experience with ChatGPT better compared to traditional grammar learning methods such as textbooks, lectures, or other educational materials.
- Item 3. I am satisfied with the effectiveness of using ChatGPT in learning French grammar.
- Item 4. I feel motivated when using ChatGPT for learning French grammar.
- Item 5. ChatGPT helps me to be more proactive in my study plan.
- Item 6. I am willing to continue using ChatGPT for learning French grammar.

Qualitative data from the interviews indicated that most students held a neutral view when comparing their experience with ChatGPT and traditional methods. Some students reported that learning grammar with ChatGPT was not worse than traditional methods but they needed more time to become fully familiar with the new tool before accurately evaluating its effectiveness:

"ChatGPT is really interesting, but mastering it is not simple. I think more time is needed for it to truly become a long-term learning tool." (I.01)

Some students preferred traditional learning methods due to their familiarity or perceived them as more effective in retaining knowledge and improving pronunciation and communication skills:

"Honestly, I was curious about ChatGPT because it's so famous rather than considering it a learning tool. Personally, I prefer direct interaction with the instructor. It is simple and effective, and the instructor can correct my pronunciation." (I.02)

Conversely, students who supported ChatGPT appreciated the flexibility, speed, and immediacy of the tool's information provision:

"It's great! This tool is very convenient. I can really learn the way I want and get answers to questions quickly, anytime." (I.03)

The data analysis allows us to reject the null hypothesis (H1o) and accept the alternative hypothesis (H1alt): there is a difference in French grammar proficiency between the experimental group, supported by ChatGPT, and the control group.

4.2. Self-Directed Learning

Quantitative data on students' SDL were collected through Survey 01. Before analysis, the reliability of the survey questions was confirmed using Cronbach's Alpha, with results of 0.844 for the pre-test and 0.909 for the post-test, indicating high reliability of the survey tool. An independent t-test was then conducted. Based on the sig. 2-tailed value and the change in average scores between the pre- and post-tests, significant differences were observed in some survey questions between the two student groups.

The first part of Survey 01, which includes five questions assessing students' overall satisfaction with the learning environment and their experience with ChatGPT (Figure 4), showed no significant difference between the two groups with regard to most questions, except for question 5:

- Question 5: "I frequently engage with ChatGPT for various tasks." The significant difference in the frequency of ChatGPT usage can be attributed to the differing roles of ChatGPT in the course for the two groups.

Figure 4: Group Differences in the Self-directed Learning Capability over Tests (Survey Form 01's first part)

No	Items	Group	Pre-test M±SD	Post-test M±SD	Mean differences (post-pre) M±SD	t	p (sig. 2-tailed)
1	I am satisfied with my university life overall	CG	3.62±1.024	4.00±0.632	0.381±1.117	1.563	0.134
		TG	3.35±0.671	3.60±0.681	0.250±0.550	2.032	0.056
2	I am satisfied with my chosen major.	CG	3.81±0.680	3.86±0.793	0.048±0.740	0.295	0.771
		TG	3.50±0.688	3.90±0.641	0.400±0.503	3.559	0.002
3	I am interested in the French courses.	CG	3.81±0.680	3.81±0.680	0.000±0.949	0.000	1.000
		TG	3.45±0.510	3.40±0.754	-0.050±0.686	-0.326	0.748
4	I feel confident and in control when using digital technologies.	CG	2.90±0.889	3.00±0.707	0.095±0.700	0.623	0.540
		TG	2.60±0.821	2.70±0.733	0.100±0.308	1.453	0.163
5	I frequently engage with ChatGPT for various tasks.	CG	2.86±1.195	4.38±0.740	1.524±1.365	5.118	0.000
		TG	2.35±0.813	2.75±0.786	0.400±0.503	3.559	0.002

The second part of the survey, which consists of 20 questions divided into three categories (Learning Motivation, Planning and Execution, and Interpersonal Communication Skills) (Figure 5), focuses on students' SDL abilities. The notable differences between the groups (TG and CG) after the pre- and post-tests were observed in the following questions:

- Question 6 (Learning Motivation): "I know what I need to learn." The CG group showed greater improvement (0.429±0.746) than the TG group (0.150±0.366).

- Question 7 (Learning Motivation): "Regardless of the result or effectiveness of my learning, I still like learning." Again, CG students showed more positive changes than TG students (0.333±0.730 vs. 0.100±0.308).

- Question 10 (Learning Motivation): "I like finding answers to questions." The CG group improved more (0.286±0.845) compared to the TG group (0.100±0.308).

- Question 14 (Planning and Execution): "I set the priorities of my learning." The CG group showed greater improvement (0.286±0.644) than the TG group (0.050±0.224).

- Question 17 (Planning and Execution): "I know how to find resources for my learning." The CG group demonstrated significant improvement (0.950±0.768), while the TG group saw a slight decline (-0.050±0.224).

- Question 18 (Planning and Execution): "I can connect new knowledge with my own personal experiences." The CG group showed better improvement (0.333±0.856) compared to the TG group (0.050±0.394).

Thus, the analysis shows that the CG group experienced significant improvement in key areas of Learning Motivation (3/6 questions) and Planning and Execution (3/11 questions).

Statements were rated on a 5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. Mean score of each item is also given.

Figure 5: Group Differences in the Self-directed Learning Capability over Tests (Survey Form 01's second part)

No	Items	Group	Pre-test M±SD	Post-test M±SD	Mean differences (post-pre) M±SD	t	p (sig. 2-tailed)
1	I am satisfied with my university life overall	CG	3.62±1.024	4.00±0.632	0.381±1.117	1.563	0.134
		TG	3.35±0.671	3.60±0.681	0.250±0.550	2.032	0.056
2	I am satisfied with my chosen major.	CG	3.81±0.680	3.86±0.793	0.048±0.740	0.295	0.771
		TG	3.50±0.688	3.90±0.641	0.400±0.503	3.559	0.002
3	I am interested in the French courses.	CG	3.81±0.680	3.81±0.680	0.000±0.949	0.000	1.000
		TG	3.45±0.510	3.40±0.754	-0.050±0.686	-0.326	0.748
4	I feel confident and in control when using the digital technologies.	CG	2.90±0.889	3.00±0.707	0.095±0.700	0.623	0.540
		TG	2.60±0.821	2.70±0.733	0.100±0.508	1.453	0.163
5	I frequently engage with ChatGPT for various tasks.	CG	2.86±1.195	4.38±0.740	1.524±1.365	5.118	0.000
		TG	2.35±0.813	2.75±0.786	0.400±0.503	3.559	0.002
Learning motivation							
6	I know what I need to learn.	CG	3.67±0.796	4.10±0.539	0.429±0.746	2.631	0.016
		TG	3.45±0.686	3.60±0.681	0.150±0.366	1.831	0.083
7	Regardless of the result or effectiveness of my learning, I still like learning.	CG	3.71±0.784	4.05±0.740	0.333±0.730	2.092	0.049
		TG	3.40±0.503	3.50±0.513	0.100±0.308	1.453	0.163
8	I strongly hope to constantly improve and excel in my learning.	CG	4.38±0.590	4.38±0.590	0.000±0.632	0.000	1.000
		TG	4.35±0.587	4.40±0.503	0.050±0.224	1.000	0.330
9	My successes and failures inspire me to continue learning.	CG	4.05±0.740	4.14±0.854	0.095±0.768	0.568	0.576
		TG	3.50±0.607	3.60±0.681	0.100±0.308	1.453	0.163
10	I enjoy finding answers to questions.	CG	3.71±0.717	4.00±0.837	0.286±0.845	1.549	0.137
		TG	3.35±0.587	3.45±0.605	0.100±0.308	1.453	0.163
11	I will not give up learning because I face some difficulties.	CG	3.90±0.768	3.95±0.669	0.048±0.865	0.252	0.803
		TG	3.50±0.513	3.60±0.503	0.100±0.308	1.453	0.163
Planning and implementation abilities							
12	I can proactively establish my learning goals.	CG	3.62±0.865	4.00±0.632	0.381±0.865	2.019	0.057
		TG	3.65±0.671	3.80±0.616	0.150±0.366	1.831	0.083
13	I know what learning strategies are appropriate for me in reaching my learning goals.	CG	3.29±0.784	3.67±0.658	0.381±1.117	1.563	0.134
		TG	3.55±0.605	3.50±0.607	-0.050±0.394	-0.567	0.577
14	I set the priorities of my learning.	CG	3.71±0.561	4.00±0.447	0.286±0.644	2.034	0.055
		TG	3.40±0.503	3.45±0.510	0.050±0.224	1.000	0.330
15	In the classroom or on my own, I am able to follow my own plan of learning.	CG	3.19±0.602	3.81±0.928	0.619±0.669	4.240	0.000
		TG	2.75±0.444	2.85±0.489	0.100±0.308	1.453	0.163
16	I am good at arranging and controlling my learning time.	CG	3.05±0.740	3.38±0.865	0.333±0.796	1.919	0.069
		TG	3.10±0.553	3.00±0.562	-0.100±0.447	-1.000	0.330
17	I know how to find resources for my learning.	CG	3.52±0.814	3.62±0.740	0.950±0.768	0.568	0.576
		TG	3.20±0.616	3.15±0.671	-0.050±0.224	-1.000	0.330
18	I can connect new knowledge with my own personal experiences.	CG	3.67±0.730	4.00±0.837	0.333±0.856	1.784	0.090
		TG	3.40±0.503	3.45±0.605	0.050±0.394	0.567	0.577
19	I understand the strengths and weakness of my learning.	CG	3.81±0.928	4.10±0.889	0.286±0.902	1.451	0.162
		TG	3.70±0.571	3.65±0.587	-0.050±0.510	-0.438	0.666
20	I can monitor my learning progress.	CG	3.71±0.644	3.76±0.889	0.048±0.740	0.295	0.771
		TG	3.25±0.444	3.40±0.503	0.150±0.366	1.831	0.083
21	I can evaluate on my own learning outcomes.	CG	4.00±0.775	3.95±0.590	-0.048±0.805	-0.271	0.789
		TG	3.50±0.607	3.60±0.598	0.100±0.308	1.453	0.163
22	My interaction with others helps me plan for further learning.	CG	3.86±0.964	4.00±0.775	0.143±0.910	0.719	0.480
		TG	3.40±0.598	3.60±0.754	0.200±0.410	2.179	0.042
Interpersonal communication skills							
23	I would like to learn the language and culture of those whom I frequently interact with.	CG	4.14±0.793	4.43±0.676	0.286±0.717	1.826	0.083
		TG	3.55±0.686	3.55±0.686	0.000±0.324	0.000	1.000
24	I am able to express messages effectively in oral presentations.	CG	3.62±0.805	3.62±1.024	0.000±0.837	0.000	1.000
		TG	3.50±0.761	3.60±0.754	0.100±0.308	1.453	0.163
25	I am able to communicate messages effectively in writing.	CG	3.48±0.680	3.57±1.076	0.095±1.091	0.400	0.693
		TG	3.45±0.510	3.55±0.605	0.100±0.308	1.453	0.163

Statements were rated on a 5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. Mean score of each item is also given.

Qualitative data from interviews also revealed that when asked about the main advantages of using ChatGPT in learning, 62.7% of students indicated that ChatGPT is a powerful tool due to its quick responses and feedback. This highlights the immediacy and efficiency of ChatGPT in providing information and supporting learning.

The opinion that ChatGPT enhances SDL and promotes active learning was shared by 49.3% of students interviewed. They expressed that using ChatGPT to learn French grammar made them feel more engaged because it was the first time they felt a clear sense of autonomy in learning a foreign language, particularly in grammar, which is typically theory-heavy and traditionally depended mostly on instructors:

"Although the teachers try hard, learning grammar isn't always comfortable. But the experience with ChatGPT is very different. I feel more

independent, able to learn at any time and in ways that suit me best. As a result, everything feels much more comfortable." (I.04)

Engineering students indicated that they are generally not proactive in learning foreign languages unless required. In class, they primarily rely on instructors for knowledge and often wait until class to ask questions when encountering difficulties:

"I'm a civil engineering student, and I don't plan to study abroad in France. But right now, French is a mandatory course, so I need to complete it. Normally, I listen to lectures and take notes. If I have questions I can't answer, I wait until class ends to ask the teacher. I think my classmates do the same." (I.01)

ChatGPT, with its interface resembling a natural conversation, makes learning and exploring information feel familiar and more enjoyable than scrolling through websites, and easier to complete tasks and answer questions so that it gradually becomes a habit. The students, therefore, felt more in control of their learning plan:

"I definitely prefer getting information by chatting with someone rather than searching online. It feels faster, more natural, and more fun. So, in the same conditions, I prefer using ChatGPT over searching Google to study." (I.04)

For students in the TG group, when asked about the main difficulties they encountered in learning French grammar, most shared the view that foreign languages are challenging because, unlike technical subjects, they require constant interaction and practice. This remains a significant obstacle for Vietnamese students. At the time the interviews were conducted, 95% of the surveyed students (from both groups) confirmed that they had only studied French at school and did not attend any additional language programs. About 75% of them participated in extra language classes solely to prepare for school exams, rather than actively learning to master the language. Students in the TG group stated that they mainly relied on instructors and class materials, and when facing difficulties with the content, they usually Googled for answers or used Google Translate, rarely exploring similar topics on their own:

"If I compare, I find learning a foreign language harder than my major. Not because it's too complex, but because it requires more time for practice: memorization, exercises, listening, and speaking practice." (I.05)

"Exam results are always important to students, whether for foreign languages or major courses. [...] I only study French according to the school's program, and I think I'm quite serious about it. I always complete my assignments and answer when asked by the teacher in class. However, I don't think I would actively explore the language on my own if it weren't required by the teacher. It's like learning another major subject [...] When needed, I use Google to find information or translate my assignments into Vietnamese. It's free, effective, and fast." (I.06)

Thus, the data analysis allows us to reject the null hypothesis (H2o) and accept the alternative hypothesis (H2alt): there is a difference in self-directed learning ability between the experimental group, supported by ChatGPT, and the control group.

5. Discussion

5.1. Addressing the Research Questions

Question 1: How does the integration of ChatGPT affect university students' French grammar learning?

The results from t-tests indicate a significant improvement in French grammar proficiency for the ChatGPT group (CG) compared to the traditional group (TG). The average post-test scores of CG students increased significantly, supporting the hypothesis that ChatGPT enhances grammar learning. These findings align with previous research that shows AI tools can effectively support language learning (Kim, 2019; Safitri et al., 2021).

Question 2: How does the integration of ChatGPT affect university students' self-directed learning?

Survey results and t-tests showed that CG students made important improvements in several SDL skills, such as staying committed to personal goals, seeking information and resources, and connecting prior knowledge with new concepts. These findings demonstrate that ChatGPT can support learners not only in acquiring knowledge but also in enhancing autonomy in their learning. This result is consistent with findings from other scholars (Lin, 2023; Han et al., 2022). Future research could further develop AI tools that specialize in supporting SDL, particularly regarding motivation and learning planning (Ali et al., 2023).

5.2. Regarding ChatGPT's use in education

In addition to validating the initial research hypotheses, several important observations were made during the study, including concerns about the accuracy of ChatGPT's responses, the inefficiency of repeated examples it provides, and the worry that over-reliance on technology might hinder the development of independent thinking in students. These issues are consistent with concerns raised in previous studies (Sullivan et al., 2023; Tlili et al., 2023).

Additionally, many students struggled with creating effective prompts when using ChatGPT, highlighting the need for further training on how to communicate

with AI tools. Interestingly, most students supported the combination of ChatGPT with traditional learning methods to optimize learning effectiveness. This result once again emphasizes the significant potential of integrating technology into education.

5.3. Regarding research validity

Although this study used a small sample size, its reliability is ensured by several factors. The timing of the research (2024) is not far removed from the introduction of ChatGPT, which helps minimize the effects of media hype surrounding the tool. Additionally, the instruments and methods used in this study have previously been employed by other authors (Shen et al., 2014; Kim, 2019; Kim et al., 2023), further reinforcing the credibility of the results. The findings of this study are most applicable to students from developing countries learning languages such as French or English, though more diverse samples are needed to confirm the generalizability of the results. Lastly, future longitudinal studies are recommended to assess the long-term impact of ChatGPT on foreign language learning at university level.

6. Conclusion

The findings from this experimental study show that ChatGPT is an effective tool in supporting foreign language learning, particularly in improving French grammar proficiency. The grammar test results of students using ChatGPT demonstrate significant progress compared to those using traditional learning methods. This GenAI tool also has a positive impact on students' SDL abilities, making them more engaged and autonomous in their foreign language learning process.

However, the study also identified some limitations in using ChatGPT, particularly the challenges of crafting interaction prompts and the chatbot's limited understanding of less common languages, which is a regular obstacle for students in developing countries. Therefore, in addition to continuously improving ChatGPT's features, training students on how to effectively communicate with AI tools is essential and warrants further exploration. This study has several limitations regarding sample size and research design, as it only included a short-term assessment. Future longitudinal studies are proposed to better evaluate the medium- and long-term impacts of ChatGPT on student learning.

References

Adenuga, B. O. (1989). *Self-directed learning readiness and learning style preferences of adult learners*. Iowa State University.

Ali, F., Choy, D., Divaharan, S., Tay, H. Y., & Chen, W. (2023). Supporting self-directed learning and self-assessment using TeacherGAIA, a generative AI chatbot application: Learning approaches and prompt engineering. *Learning: Research and Practice*, *9*(2): 135-147. https://doi.org/10.1080/23735082.2023.2258886

Baharom, M. M., Atan, N. A., Rosli, M. S., Yusof, S., & Abd Hamid, M. Z. (2020). Integration of science learning apps based on inquiry-based science education (IBSE) in enhancing students' science process skills (SPS). *International Journal of Interactive Mobile Technologies (iJIM)*, *14*(9), 95-105. https://doi.org/10.3991/ijim.v14i09.11706

Brookfield, S. D. (1985). Self-directed learning: A conceptual and methodological exploration. *Studies in the Education of Adults*, *17*(1): 19-32.

Campbell, D. T., & Stanley, J. C. (2015). *Experimental and quasi-experimental designs for research*. Ravenio Books.

Chené, A. (1983). The concept of autonomy in adult education: A philosophical discussion. *Adult Education Quarterly, 34*(1): 38-47.

Chong, S. W., & Reinders, H. (2020). *Technology-mediated task-based language teaching: A qualitative research synthesis*. Language Learning and Technology.

Dao Xuan Quy, Le Ngoc Bich, Phan Xuan Dung, Ngo Bac Bien. (2023). Can ChatGPT pass the Vietnamese National High School Graduation Examination? *arXiv*. https://doi.org/10.48550/arXiv.2306.09170

Fauzan, A., Triyono, M. B., Hardiyanta, R. A. P., Daryono, R. W., & Arifah, S. (2023). The effect of internship and work motivation on students' work readiness in vocational education: PLS-SEM approach. *Journal of Innovation in Educational and Cultural Research*, *4*(1): 26-34.

Garrison, D. R. (1997). Self-directed learning: Toward a comprehensive model. *Adult Education Quarterly, 48*(1): 18-33.

Griffiths, C. (2008). Strategies and good language learners. In *Lessons from good language learners*. Cambridge University Press. https://doi.org/10.1017/CBO9780511497667.009

Han, J. W., Park, J., & Lee, H. (2022). Analysis of the effect of an artificial intelligence chatbot educational program on non-face-to-face classes: A quasi-experimental study. *BMC Medical Education, 830*(22). https://doi.org/10.1186/s12909-022-03898-3

Hoang Ngoc Tue, Duong Ngoc Han, Le Duc Hanh. (2023). Exploring chatbot AI in improving vocational students' English pronunciation. *AsiaCALL Online Journal*, *14*(2): 140-155. https://doi.org/10.54855/acoj.231429

Hong, W. (2023). The impact of ChatGPT on foreign language teaching and learning: Opportunities in education and research. *Journal of Education and Technology Innovation, 5*(1): 5-22. https://doi.org/10.61414/jeti.v5i1.103

Kerka, S. (1994). *Self-directed learning: Myths and realities*. ERIC Clearinghouse on Adult, Career, and Vocational Education.

Kim, N. (2019). A study on the use of artificial intelligence chatbots for improving English grammar skills. *Journal of Digital Convergence, 17*: 37-46.

Kim, S., Shim, J., & Shim, J. (2023). A study on the utilization of OpenAI ChatGPT as a second language learning tool. *Journal of Multimedia Information System, 10*: 79-88. https://doi.org/10.33851/JMIS.2023.10.1.79

Knowles, M. S. (1970). *The modern practice of adult education: Andragogy versus pedagogy*. Association Press.

Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Association Press.

Kuhn, D., & Ho, V. (1980). Self-directed activity and cognitive development. *Journal of Applied Developmental Psychology, 2*(1): 119-133.

Lin, X. (2023). Exploring the role of ChatGPT as a facilitator for motivating self-directed learning among adult learners. *Adult Learning*. https://doi.org/10.1177/10451595231184928

Loeng, S. (2020). Self-directed learning: A core concept in adult education. *Education Research International*. https://doi.org/10.1155/2020/3816132

Nguyen, H. T., Fehring, H., & Warren, W. (2015). EFL teaching and learning at a Vietnamese university: What do teachers say? *English Language Teaching, 8*(1): 31-43.

Parmaxi, A., & Demetriou, A. A. (2020). Augmented reality in language learning: A state-of-the-art review of 2014-2019. *Journal of Computer Assisted Learning, 36*(6): 861-875. https://doi.org/10.1111/jcal.12486

Pratt, D. D. (1993). Andragogy after twenty-five years. In S. B. Merriam (ed.). *An update on adult learning theory*. *New Directions for Adult and Continuing Education, 57*. Jossey-Bass.

Rahardjo, A., & Pertiwi, S. (2020). Learning motivation and students' achievement in learning English. *JELITA, 2*(1): 56-64.

Rathore, B., & Chopra, D. (2020). Self-directed learning: Assessment of students' abilities and their perspective. *AJP Advances in Physiology Education, 44*: 383-386. https://doi.org/ 10.1152/ advan.00010.2020

Rubin, J., & Thompson, I. (1994). *How to become a more successful language learner*? Heinle & Heinle.

Safitri, F., Hardini, T., Setiadi, R., & Mutiarsih, Y. (2021). Usability measurement: Chatbot as a pedagogical support for learning French grammar. In Proceedings of the 2021 *International Conference on Emerging Technologies for Research, Management, and Industrial Applications*. IEEE. https://doi.org/10.2991/assehr.k.211119.042

Sefriani, R., Sepriana, R., Radyuli, P., & Hakiki, M. (2022). Android-based blended learning media for computer maintenance lectures. *Journal of Education Technology, 6*(1): 119-125.

Shaikh, S., Yayilgan, S. Y., Klimova, B. & Pikhart, M. (2023). Assessing the usability of ChatGPT for formal English language learning. *European Journal of Investigation in Health, Psychology and Education, 13*, 1937-1960. https://doi.org/10.3390/ejihpe13090140

Shen, W., Chen, H., & Hu, Y. (2014). The validity and reliability of the self-directed learning instrument (SDLI) in mainland Chinese nursing students. *BMC Medical Education, 14*: 108. https://doi.org/10.1186/1472-6920-14-108

Suanmali, C. (1981). *The core concepts of andragogy*. Teachers College. Columbia University.

Sullivan, M., Kelly, A., & McLaughlan, P. (2023). ChatGPT in higher education: Considerations for academic integrity and learning. *Journal of Applied Learning and Teaching, 6*(1): 31-40. https://doi.org/10.37074/jalt.2023.6.1.17

Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What is the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments, 10*: 1-24.

Tran Tin Nghi, Tran Huu Phuc, Nguyen Tat Thang. (2019). Applying AI chatbot for teaching a foreign language: An empirical research article. *International Journal of Scientific & Technology Research, 11*(8): 897-902.

Van den Berg, G., & du Plessis, E. (2023). ChatGPT and Generative AI: Possibilities for Its Contribution to Lesson Planning, Critical Thinking and Openness in Teacher Education. *Education Sciences, 13*(10). https://doi.org/10.3390/educsci13100998

Van der Walt, J. L. (2019). The term "self-directed learning" - back to Knowles, or another way to forge ahead? *Journal of Research on Christian Education, 28*(1): 1-20.

Yan, D. (2023). Impact of ChatGPT on learners in a L2 writing practicum: An exploratory investigation. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-11742-4

Yilmaz, R., & Karaoglan Yilmaz, F. G. (2023). The effect of generative artificial intelligence (AI)-based tool use on students' computational thinking skills, programming self-efficacy, and motivation. *Computers and Education: Artificial Intelligence, 4*: 100147. https://doi.org/10.1016/j.caeai.2023.100147