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AI-Assisted Self-Paced Grammar Instruction in Secondary Education: Balancing Individualized and Collaborative EFL Learning

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ABSTRACT

This study explores the implementation of a self-paced grammar instruction system supported by generative AI tools (ChatGPT and Google Gemini) in an under-resourced Japanese high school. The program integrated level-based worksheets, AI-generated feedback, and teacher scaffolding over six weeks, targeting students with diverse academic backgrounds and interrupted schooling histories. Data were collected through surveys, progress records, and classroom observations. Results indicated that students appreciated the flexibility and autonomy of the self-paced approach. While some desired more direct teacher input, the overall findings suggest that the AI-supported learning environment contributed to increased motivation, iterative learning, and differentiated support. Rather than focusing on the effects of AI alone, this study highlights how learner-centered design, when supplemented by AI tools, can foster engagement and autonomy in linguistically diverse classrooms. This practitioner-research contributes to the growing field of AI-supported education by presenting a scalable model designed for under-resourced or alternative secondary education contexts. The study underscores the relevance of learner-centered pedagogy and self-paced systems enhanced by AI tools, especially in schools serving students with diverse needs. Implications for using generative AI to support autonomy, inclusion, and engagement in EFL classrooms are discussed.

KEYWORDS: Self-paced learning, AI tools, Individualized learning, Collaborative learning

Introduction

In recent years, secondary schools in Japan have faced increasing challenges in addressing the needs of students with highly diverse academic backgrounds and inconsistent engagement with compulsory education. This issue is particularly salient in night high schools, where many students enroll after experiencing interrupted or irregular schooling, in contrast to their peers in regular day schools.

Given such diverse learning needs, Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT, 2021) has emphasized the importance of both individualized learning (*"kobetsu-saiteki na manabi"*) and collaborative learning (*"kyōdō-teki na manabi"*) in fostering inclusive classroom environments. These principles are especially critical in English grammar instruction, where foundational gaps can significantly hinder learners' progress and confidence.

Meanwhile, the advancement of generative artificial intelligence (AI) tools, such as ChatGPT and Google Gemini, has created new possibilities for supporting learner autonomy. These technologies offer students opportunities to receive immediate feedback, revise their work independently, and engage with content at a self-directed pace.

This paper reports on the implementation of a self-paced grammar instruction system supported by generative AI in a Japanese night high school. The aim of the study is to investigate how the integration of level-based worksheets, AI tools, and teacher feedback can foster both individualized and collaborative learning in a linguistically diverse classroom.

Literature Review

Recent advances in artificial intelligence (AI) have significantly influenced the landscape of language education. A systematic review by Zhu and Wang (2024) revealed that AI applications in language learning have expanded rapidly over the period from 2013 to 2023, including tools for grammar correction, intelligent tutoring, and personalized feedback. These technologies are increasingly recognized for their potential to enhance learner engagement, autonomy, and the development of language skills (Wei, 2023). For example, Kamaruzaman and Sulaiman (2025) argue that technologies, including AI tools, are increasingly integrated into ESL/EFL classrooms to meet diverse learner needs, and can effectively support grammar learning when combined with appropriate pedagogical strategies.

Likewise, the study of Lee (2016), although predating AI, laid the groundwork and suggested that incorporating digital tools into task-based learning fostered the autonomy of the learners. This study was published before generative AI; however, the findings can apply to the current educational setting if generative AI is counted as a digital tool. Self-paced and self-regulated learning (SRL) has also gained prominence, particularly with the integration of digital technologies. The findings of Lan and Zhou (2025) suggest that AI tools could support learners in setting goals, monitoring progress, and self-assessing performance—key elements of SRL. Similarly, Li and Bonk (2023) found that mobile-based applications such as Duolingo contribute positively to learner autonomy in out-of-class settings.

In addition, several studies have explored the use of AI-powered chatbots and tutoring systems for real-time feedback. For instance, Glandorf et al. (2025) examined grammar control in chatbot-generated responses. These systems were found to promote interactive learning experiences, support learners based on their proficiency, and encourage repeated practice. Xu et al. (2025) also proposed a collaborative model in which teachers and AI systems complement each other in providing personalized support and scaffolding to learners of different proficiency levels.

Despite these benefits, scholars have noted limitations regarding the emotional and social dimensions of learning. Zhai et al. (2024) found that overreliance on generative AI tools can significantly and negatively influence cognitive abilities, such as decision-making, critical thinking, and reasoning.

In response, the Japanese Ministry of Education (MEXT, 2021) emphasized the need for balancing individualized and collaborative learning approaches. The integration of AI must therefore be accompanied by careful teacher intervention, as highlighted in Szabó and Szoke (2024), to foster both autonomy and inclusive, human-centered classrooms so that teachers can avoid students' overreliance on AI tools.

While previous studies have highlighted both the advantages and limitations of integrating AI into language education, few have examined how such tools can be practically implemented in under-resourced or non-mainstream educational contexts such as Japanese night high schools. These schools often face unique challenges, including diverse student proficiency levels, irregular attendance, and limited institutional resources. In Japan, the number of students enrolling in non-traditional high school settings such as part-time and correspondence schools has been gradually increasing. According to MEXT (2023), approximately 170,000 students were enrolled in part-time and correspondence courses at the upper secondary level, reflecting a growing demand for flexible educational pathways. This trend underscores the importance of

exploring effective instructional practices within these unique learning environments. As part-time night schools typically serve students with diverse academic histories and learning needs, research into their pedagogical strategies—including the use of AI to support grammar instruction—holds practical value for addressing broader issues of equity and individualized support in education.

The current study seeks to address this gap by implementing a self-paced grammar instruction system using AI-assisted tools in a Japanese night high school. By combining level-based worksheets, generative AI support, and teacher scaffolding, this study aims to explore how AI can facilitate both individualized and collaborative learning under such constraints. In doing so, it contributes to the growing body of research that calls for more context-sensitive applications of educational technology in linguistically, socially, and educationally diverse classrooms.

Research Questions

This study aims to examine the effectiveness of self-paced, level-based grammar instruction in a Japanese high school context. The following research questions guide the investigation:

1. How effective is self-paced, level-based grammar instruction for supporting English learning among students in a Japanese night high school?
2. How do students perceive the benefits and challenges of learning grammar at their own pace?

Methods

Pedagogical Setting & Participants

This study was conducted at a public high school located in Hokkaido, Japan. The school serves students who, for various personal or academic reasons, chose a part-time night high school. A total of 44 participated in the self-paced grammar instruction project. All students in the class experienced the self-paced learning system as part of their regular English curriculum. Among them, the majority voluntarily agreed to provide their learning data for research purposes. The author of this study is the classroom teacher who directly designed and facilitated the implementation of the instructional program. The survey was administered in Japanese, the students' first language, to ensure clarity and maximize response validity.

Design of the Study

This study adopted a classroom-based exploratory research design. It aimed to investigate the effectiveness of a self-paced, level-based grammar instruction system integrated with generative AI tools in a Japanese night high school. The research was situated within the natural context of an ongoing English class, with no experimental manipulation or control group involved. Such research methods are ethically discouraged in public education settings in Japan. Both quantitative and qualitative data were collected to explore how the instructional approach impacted student engagement, autonomy, and attitudes toward English learning. The study can be characterized as practitioner research, in which the teacher-researcher implemented and monitored the instructional system to derive insights for improving classroom practice.

Data collection & analysis

The instructional program was implemented over a six-week period during regular English classes. Students were given level-based grammar worksheets that covered foundational grammatical items, beginning with junior high school content. Each student worked at their own pace, submitting worksheets to the teacher for feedback. Before resubmission, students were encouraged to revise their answers using generative AI tools such as ChatGPT or Google Gemini to independently identify and correct errors. In some cases, students also sought assistance from peers, incorporating elements of collaborative learning into the process. To track progress, individual progress sheets were maintained, documenting the number of worksheets completed, the frequency of revisions, and teacher feedback. Upon completion of the program, students were invited to complete an anonymous post-project survey, which included both four-point Likert-scale items (1: strongly disagree and 4: strongly agree) and open-ended questions. In Japan, there is a strong tendency for students to choose the neutral option when available. (Lee et al., 2002). 44 participating students, the majority of all students, agreed to share their data for research purposes. The quantitative data from the survey were analyzed descriptively to examine trends in students' perceptions of the self-paced system, its usability, and motivational impact. The open-ended responses were thematically categorized to identify recurring perceptions regarding autonomy, AI support, and the role of teacher and peer interaction. The students' worksheets and progress records were also reviewed to observe patterns in revision behavior and AI usage.

Results/Findings

RQ1: How effective is self-paced, level-based grammar instruction for supporting English learning among students in a Japanese night high school?

The survey results indicated a generally positive perception of the self-paced grammar instruction system. Among the Likert-scale items, nearly 85% of students agreed or strongly agreed that self-paced learning helped develop their English proficiency. Likewise, over 80 % of students agreed or strongly agreed that self-paced learning matches their learning needs. Approximately 77 % of students reported an increase in motivation for learning English. Several students mentioned feeling less pressure and more control over their learning, such as 'I could work at my own speed without stress' and 'I understood grammar more clearly by going step-by-step.'

RQ2: How do students perceive the benefits and challenges of learning grammar at their own pace?

Thematic analysis of the open-ended responses from the post-project survey revealed several recurring themes regarding students' experiences with the self-paced grammar instruction system. A total of 44 students participated in the qualitative portion, providing comments that shed light on both the benefits and challenges of the system.

Many students appreciated the ability to learn at their own pace. As one student stated, "自分のペースでできたから安心した。." (*"I felt relaxed because I could learn at my own pace."*). This sense of autonomy appeared to reduce anxiety and promote sustained engagement.
Others emphasized the collaborative aspects, such as peer support and informal group work. A student commented, "友達に聞きながら進められてよかった。." (*"It was good that I could ask my friends while working."*), indicating that social interaction enhanced understanding and motivation even within a self-paced framework.

Repetition and the opportunity to revisit errors were also highlighted as beneficial. For example, "間違ったところを何度もやり直せた。." (*"I could repeat the parts I got wrong several times."*) suggests that iterative learning was effective in reinforcing understanding.
However, some students expressed a desire for more teacher involvement. "先生がもっと近くで見てくれると嬉しい。." (*"I would feel better if the teacher watched over me more."*) implies that a balance between autonomy and guidance may be necessary.

A few comments pointed to limitations in the system. "サボる人はなかなか進まないと思っ

た。.” (*"I felt that students who slacked off didn't make much progress."*) reflects concerns about self-discipline in a flexible environment. Interestingly, such concerns were primarily voiced by students with lower levels of proficiency. This can suggest that beginning-level learners need more support from the teacher than those with stronger proficiency.

Overall, the qualitative data indicated that students generally valued the system's flexibility, peer interaction, and opportunities for reflection, though some requested increased teacher support and clearer instructions.

Table 1. Themes from student reflections on Self-paced Grammar Instruction

Category	Student comment (Original)	Student comment (English translation)
Autonomy	自分のペースでできたから安心した。	I felt relaxed because I could learn at my own pace.
Collaboration	友達に聞きながら進められてよかった。	It was good that I could ask my friends while working.
Repetition	間違ったところを何度もやり直せた。	I could repeat the parts I got wrong several times.
Teacher support	先生がもっと近くで見てくれると嬉しい。	I would feel better if the teacher watched over me more.
Material	プリントにもっと例があるとやりやすい。	It would be easier if the worksheets had more examples.
Limitations	サボる人はなかなか進まないと思った。	I felt that students who slacked off didn't make much progress.

Note. Translation provided by the author

Discussion

This study examined the effects of self-paced grammar instruction, supported by generative AI tools, in a Japanese high school. Three research questions guided the investigation, focusing on student perceptions, qualitative experiences, and the role of AI in learning. The results revealed several significant insights relevant to EFL instruction in diverse classroom settings.

First, the majority of students responded positively to the self-paced learning environment. They appreciated the ability to work at their own speed and reported increased understanding and confidence. This supports previous findings that individualized learning can enhance student engagement and reduce language learning anxiety, especially for learners with uneven academic backgrounds.

Second, qualitative responses highlighted the importance of autonomy, peer collaboration, and iterative learning. Many students felt secure in revisiting errors and appreciated the chance to help and be helped by classmates. These interactions suggest that even in a self-paced model, collaborative elements can reinforce learning and foster a sense of community.

Nonetheless, this study had limitations. Without explicit AI-related survey data, conclusions about student perceptions of AI remain speculative. Additionally, while the system supported many learners, a few students with low self-regulation struggled to stay on track, suggesting that such programs should include scaffolding provided by the teachers. It is possible that some of the difficulties with self-regulation may relate to neurodevelopmental factors, such as ADHD. Future studies might explore the intersection of individualized instruction, technology, and special education needs.

Future studies could incorporate mixed-methods designs to capture both the observable behaviors and internal attitudes toward AI-supported learning. Moreover, extending this model to other subjects or school types may reveal its broader applicability and inform policy decisions in Japanese secondary education.

In conclusion, the integration of self-paced instruction and AI support shows promise for fostering individualized and collaborative learning. As educational environments continue to diversify, especially in settings like night high schools, such flexible, technology-enhanced models may prove increasingly valuable. These findings align with global calls for equitable, learner-centered instruction that leverages digital tools. Particularly in non-mainstream settings, such as alternative high schools or low-resource environments, generative AI tools may serve as accessible and adaptive supports for grammar instruction. Further cross-cultural research is needed to evaluate transferability and ethical integration of such systems worldwide.

Conclusion

This study explored the implementation of a self-paced grammar instruction system in a Japanese high school, designed within an environment where generative AI tools were available

as optional learning resources. The findings indicated that such a system can be both feasible and effective in accommodating learners with diverse academic backgrounds, offering opportunities for individualized learning while maintaining collaborative elements.

Students generally appreciated the flexibility of the self-paced model, as well as the opportunity to review and improve their work iteratively. Classroom observations indicated that some students made use of generative AI tools, such as ChatGPT, during the learning process. However, due to the absence of explicit survey items or interview data related to AI usage, the specific effects of these tools on learning outcomes cannot be conclusively determined.

Moreover, the study highlighted the importance of balancing learner autonomy with appropriate teacher support, particularly for students with lower levels of self-regulation. The findings also suggest the potential value of incorporating peer-support structures, such as a mini-teacher system involving higher-proficiency students, to promote collaborative learning even within individualized instructional frameworks.

In conclusion, self-paced grammar instruction represents a flexible and inclusive pedagogical approach for linguistically diverse classrooms, particularly in non-traditional educational settings such as night high schools. Future research should employ more systematic methods to examine how digital tools, including generative AI, are used by students and how they may interact with learner autonomy, collaboration, and instructional support over time.

References

Glandorf, D., Cui, P., Meurers, D., & Sachan, M. (2025). Grammar control in dialogue response generation for language learning chatbots. *arXiv preprint,* arXiv:2502.07544. https://arxiv.org/abs/2502.07544

Kamaruzaman, N.I. & Sulaiman, N.A. (2025). *The English Teacher, 54*(2), 92-107

Lan, M., & Zhou, X. (2025). A qualitative systematic review on AI empowered self-regulated learning in higher education. *npj Science of Learning, 10*(21). https://doi.org/10.1038/s41539-025-00319-0

Li, Z., & Bonk, C. J. (2023). Self-directed language learning with Duolingo in an out-of-class context. *Computer Assisted Language Learning,* 1–23. https://doi.org/10.1080/09588221.2023.2206874

Lee, L. (2016). Autonomous learning through task-based instruction in fully online language courses. *Language Learning & Technology.* https://scholars.unh.edu/lang_facpub/140/

Lee, J. W., Jones, P. S., Mineyama, Y., & Zhang, X. E. (2002). Cultural differences in responses to a Likert scale. *Research in Nursing & Health, 25*(4), 295–306. https://doi.org/10.1002/nur.10041

Ministry of Education, Culture, Sports, Science and Technology. (2023). *School basic Survey (FY2023)*.https://www.mext.go.jp/en/publication/statistics/title01/detail01/1373636.htm

Ministry of Education, Culture, Sports, Science and Technology. (2021). *Toward enhancing both individualized learning and collaborative learning: Explanatory material*.https://www.mext.go.jp/content/210330-mxt_kyoiku01-000013731_09.pdf

Szabó, F., & Szoke, J. (2024). How does generative AI promote autonomy and inclusivity in language teaching? *ELT Journal, 78*(4), 478–488. https://doi.org/10.1093/elt/ccae052

Wei, L. (2023). Artificial intelligence in language instruction: Impact on English learning achievement, L2 motivation, and self-regulated learning. *Frontiers in Psychology,* Article 1261955. https://doi.org/10.3389/fpsyg.2023.1261955

Xu, Y., Meier, D., & Freeman, A. (2025). Building a teacher-AI collaborative system for personalized instruction and assessment. *University of Michigan*. https://marsal.umich.edu/grants-awards/building-teacher-ai-collaborative-system-personalized-instruction-and-assessment