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The AI-Supported Instructional Design in PBL Integrating Chinese Language Learning and Multimedia Creation

Satoko SUGIE [a*]
[a] *Faculty of Humanities, Sapporo International University, Japan*
* satoko-sugie@ts.siu.ac.jp

Abstract: The rapid development of AI (Artificial Intelligence) is enhancing the potential to accelerate a paradigm shift in foreign language teaching and learning. Instructional design must shift beyond knowledge learning and skills training to include more significant opportunities for practical application in authentic contexts. To do so, it is necessary to investigate the pedagogical possibilities of generative AI through specific educational practices. Thus this study intends to explore the potential of using generative AI to improve the efficiency and effectiveness of PBL (Problem/Project Based Learning) which integrates foreign language, information media, and professional education. This study suggests a PBL course design integrating Chinese language, tourism, and multimedia creation learning outcomes at a Japanese university, as a preliminary phase to compare and examine the teaching and learning processes between traditional methods and proactive AI-enabled methods. Through qualitative exploration of integrating generative AI into traditional instructional design, this paper considers how to organize the elements of teaching and learning for a renewed approach with greater efficiency and quality of learning outcomes.

Keywords: generative AI, Chinese as a foreign language, multimedia creation, instructional design, Project-Based Learning

1. Introduction

Japanese universities commonly teach introductory foreign language courses through lecture-style classes, where in-class activities are mainly individual knowledge learning. Since the outbreak of the COVID-19 pandemic, the use of ICT (Information and Communication Technology) in education has become somewhat more normal. From a broader perspective, blended and hybrid ICT-based teaching/learning has been identified as a worthy challenge to assist teachers in proficiency of ICT skills (Beatty, 2019). However, even during the pandemic, MEXT (Japan's Ministry of Education, Culture, Sports, Science, and Technology) emphasized traditional, in-person instruction (MEXT, 2021a), expressing a hope that by 2023, there would be a return to traditional teaching (MEXT, 2021b).

In contrast to government hopes, the evolution of generative AI has been a societal paradigm shift that educators noticed. Generative AI supports more efficient education of vocabulary, grammar, and writing in foreign languages. Frequent updates have further enhanced accuracy, rendering AI more cost-effective (Kondo et al., 2023; Niño, 2020; Tsai, 2020). However, most traditional teachers doubt the improvement through AI, and think communication practice cannot be achieved without repeating physical lessons on vocabulary, grammar, and pronunciation (Onishi, 2008). Teachers from a behaviorist or communicative background trust far more in the methods they applied during their own success as foreign language learners. Studies investigating how to use generative AI are vital because the problem of 'the Chasm' (Moore, 1991) is equally true in the education field, and there may be a deep divide between early adopters and the majority of teachers on how best to apply such new technology.

2. Research Question

This study seeks to use the Japanese government's tentative guidelines for the use of generative AI (MEXT, 2023). The seven points of that guideline can be summarized as follows.

Table 1. *The seven points of the tentative guidelines for the use of generative AI*

(1) Encourage moral education	use AI-generated information as a teaching tool for learners to discover its characteristics and limitations.
(2) Allow discussions on Generative AI	use Generative AI as a material for learners to think and discuss more actively.
(3) Support clear expression and generalization of individual learners' knowledge, thoughts, and lived experiences	discover new perspectives on the results of summaries and discussions in group work with a generative AI.
(4) Optimize language assistance in practice exercises	use AI as a dialogue companion or improved dictionary to learn more natural and native-like expressions, searching for words and example sentences.
(5) Support better editing	repeatedly use AI to revise sentences learners have written themselves to improve the quality.
(6) Encourage advanced learning	use sophisticated programming through generative AI.
(7) Support assessment	test tools to assess problem-finding and problem-solving abilities using generative AI.

Since this study focuses on foreign language education, there are possibilities for learners to use guidelines 3, 4, and 5, and for teachers to use 7.

This study is action research to explore situational questions with a qualitative approach. Based on the instructional design of a class conducted by the author in 2023, learning activities and tools have been organized which could potentially apply generative AI. To examine the effectiveness of teaching and learning using generative AI compared to traditional teaching and learning strategies, it is necessary to identify what teaching and learning processes are used in traditional instructional design, starting with an exploration of the potential for improvement. The research question of this study is as follows: How could AI enhance a PBL course integrating foreign language learning and multimedia creation?

3. Methods

In this study, new viewpoints on how to integrate generative AI were examined in comparison to traditional instructional design, through subjective observations based on this author's years of teaching experience. Analysis was conducted on the design of a spring semester course (15 weeks), considering the strategies, outcomes and likely challenges in lesson design and learning tasks.

3.1 Class Setting

The learners were twenty-three first-year Japanese university students who have studied basic Chinese as a foreign Language for less than one year. The class is composed of a mixture of Humanities and Science majors. The learning environment is a face-to-face class in a general classroom, where students therefore bring their own devices such as laptops and smartphones. The network environment is connected to the university's Wi-Fi. Learners use the LMS (Learning Management System) for class communication, browsing learning materials, submission of assignments, and reviewing teacher feedback. Grading is based on the submission of in-class and out-of-class assignments, in-class discussions, the submission of videos on learning outcomes, and a final presentation in Chinese.

3.2 Learning Goals and Activities

The class has two main themes. The first is cross-cultural understanding and vocabulary learning necessary for welcoming Chinese FIT (Foreign Independent Tour) visitors to Hokkaido, Japan's Northernmost province. For this purpose, students learn words, phrases, and conversational expressions used for tourism hospitality through a set textbook. Moreover interactive learning happens as international students answer learners' questions about Chinese culture. Second, the students create a tourism promotional video in Chinese. For this purpose, students make a video in groups that discovers, co-creates, and promotes local attractions from the learner's perspective. This requires extracurricular collaboration. The three learning goals are as follows: (1) To be able to address and answer simple Chinese questions in the tourism industry and hospitality situations, (2) Understand the norms, beliefs, and culture of Chinese visitors to Japan from a cross-cultural perspective, and (3) To be able to utilize Chinese through tools including distance learning, automatic voice translators, and video editing applications.

4. Data analysis

A qualitative approach was adopted involving analysis of lesson plans, teaching experience and evaluation of possible student outcomes. The comparison of traditional and AI-enhanced course designs, including learner and teacher outcomes are shown in Figure 1. The conventional work of teachers and learners across the usual fifteen-week course was summarized, and then potential AI-supported alternatives were devised.

Learning activities	Learners' work		Teacher' s work	
	Conventional approach	AI-supported	Conventional approach	AI-supported
Sess.1: The Guidance. Learning and presentation of Chinese self-introduction expressions.	*Independent work* • Write self-introduction in Japanese. • Translate self-introduction sentences into Chinese using textbooks, dictionary /translation Applications. • Teacher one-on-one instruction, group practice	[LI/TR] Translate Japanese into Chinese with AI. [PRON] Check and practice pronunciation using the audio function of the dictionary / translation Applications.	• Read and correct Chinese self-introductions. • Listen to a Chinese self-introduction and correct pronunciation. • Practice accurate pronunciation through group and individual instruction.	[LI/TR] Consider more appropriate expressions with AI translation. *AI technology will be able to automatically analyze the pronunciation characteristics of individual learners and provide practice exercises and corrective tips.
Theme 1: cross-cultural understanding and vocabulary learning necessary for welcoming Chinese FIT visitors				
Sess.2: Sharing of Chinese name lists and roll call (in every class). Learning and practicing Chinese pronunciation and notation "pinyin" .	*Independent work* • Listen to their own name in Chinese and respond in Chinese. • Read aloud the words and sentences instructed by the teacher. *pair/group work* • Practice customer and clerk conversation.	[PRON] Input words and sentences in the textbook via AI chat and translation Applications and practice the pronunciation of the synthetic voice. [PRON] Practice FAQ phrases using a voice-activated pronunciation practice system.	• Roll call in Chinese, greeting and addressing to the students. • Nominate students and correct and instruct them regarding errors in reading aloud words and sentences. • Teach accurate pronunciation by listening to students' conversation.	[PRON] Let learners waiting their turn for tutoring practice pronunciation, writing, and translation. [PRON] Let learners waiting their turn for tutoring practice pronunciation using a voice-activated pronunciation practice system.
Sess.3: Sharing the questions and answers about China and Chinese culture. Writing a short essay about self-introduction.	*Independent work* • Summarize international students' answers to questions from Japanese students. • Write a detailed self-introduction in Japanese. • Translate the Japanese self-introduction into Chinese. pair/group work • Speech practice of self-introduction.	[INF-S] Summarize international students' answers. [LI/TR] Translate Japanese into Chinese. [PRON] Check and practice correct pronunciation using the audio function of the dictionary and translation Applications. [DE/FAQ] Practice dialogue and FAQ sessions with AI.	• Correct student writing and provide feedback with revisions and comments on improvements. • Listen to the student's speech and advise revisions.	[LI/TR] Consider more appropriate expressions based on AI translation. *AI will be able to analyze the pronunciation characteristics of individual learners and provide practice exercises and corrective tips.

Sess.4: Sharing questions and answers about China and Chinese culture. Learning how to translate foreign words into Chinese. Chinese pronunciation practice.	*Independent work* • Summarize international students' answers to questions from Japanese students. • Present on the translation of foreign words into Chinese. • Share classmates' answers to deepen learning. • Practice pronunciation of tourist conversation with "Ondoku Chinese".	[DE/FAQ] Practice dialogue on tourism hospitality with AI.	• Present a mind map of the Chinese translation of foreign words and provide additional explanations. • Teach the key points of pronunciation of words that failed to be recognized phonetically.	
Sess.5-8: Sharing FAQ about China and Chinese culture. Learning and comparing the Basic Characteristics of the Chinese people.	*Independent work* • Summarize international students' answers. *pair/group work* · Read the textbook and understand the basic character of Chinese people. · Consider the differences between Japanese and Chinese people and anticipate possible problems and issues that may happen in a tourism situation. · Discuss how problems and issues can be reduced or improved.	[INF-S] Summarize the answers with AI. [INF-CL] Collect information on troubles and problems that Chinese tourists are likely to encounter and how to solve them through web searches and conversations with AI. [INF-S] Summarize the results of the discussion.	• Introduce specific episodes based on practical experience as an interpreter and tourist guide. • Facilitate students to think more deeply about cross-cultural understanding and cultural conflicts while the discussion. • Provide feedback on fact-checking of information by AI.	
Theme 2: the students will create a tourism promotion video using the Chinese language				
Sess.9: Writing a proposal for a Hokkaido short trip.	*Independent work* • Write a video proposal.	[INF-CL][INF-CT][INF-S] Consider the focus of the plan based on the keywords of the concept interacting with AI.	• Explain the structure and components of the video proposal. • Explain trends in the preferences and needs of the target Chinese inbound tourists.	[INF-CL] Collect information from AI on trends in preferences and needs of Chinese inbound tourists (data prior to 2021).
Sess.10: Creating a video composition chart.	*pair/group work* • Create a structure chart for the video. • Consider the necessary elements (the story, screen transitions, shooting locations and scenes).		• Explain the purpose, structure, content, etc. of structure chart for the video.	[INF-CT] Categorize the focus and evaluation perspectives using AI based on the requirements of the structure chart.
Sess.11: Video Shooting planning. Learning how to use video editing APPs.	*pair/group work* • Share the photos and videos. • Shooting plannning (place, time, and scenes). • Learn the how to edit the movie with APPs.	[MLT] Generate images and videos interactively with AI.	• Practical instruction of video editing APPs. • View sample videos and solve operational difficulties and problems.	
Sess.12: Video editing and feedback on comments.	*pair/group work* • Edit videos using APPs.	[MLT] Generate images and videos interactively with AI.	• View videos and provide feedback on modifications and improvements.	
Sess.13: Translation of Chinese ticker and narration dialogue. Practicing introduction of a video overview.	*pair/group work* • Translate tickers, subtitles, and narration from Japanese to Chinese • Write video summary and translate it from Japanese to Chinese.	[LI/TR] Translate Japanese into Chinese using AI.	• Revise Chinese sentences submitted by students. • Explain the reasons for correction/improvement and provide feedback.	[LI/TR] Consider more appropriate wording using AI.
Sess.14: Revising the video. Submit video assignments.	*pair/group work* • Modify the video based on teacher feedback. · Practice speeches about the video overview.	[LI/TR] Input the sentences via AI chat and translation APPs, practice through listening to the synthetic voice pronunciation.	• Review the revised video and provide additional comments.	
Sess.15: Presentation and mutual evaluation.	*pair/group work* • Speech in Chinese about the overview and highlights of the video. • Evaluate classmates' videos and write the comments (with online form).	[MLT] Creating Synthesized Speech with AI.	• Provide supplementary information on parts of the student's speech that are difficult to understand. • Summarize the form responses and provide immediate feedback. • Provide summary comments.	[INF-S] Summarize students' comments and create mind maps with AI.

Figure 1. *Comparison of AI-supported instructional design, activities, and tasks*

5. Discussion

The improvements over the traditional teaching and learning process as outlined in Figure 1 can be categorized into the following seven aims. The acronyms shown in [ ] in AI-supported elements in Fig.1 represent the same seven elements.

(1) [LI/TR] Language input and translation: Japanese to Chinese/Chinese to Japanese translation by text, Chinese input by voice
(2) [PRON] Pronunciation Practice: Input (listen for accurate pronunciation) and output (correct pronunciation)
(3) [DE/FAQ] Dialogue exercise, question and answer.
(4) [INF-CL] Information collection
(5) [INF-CT] Information categorization
(6) [INF-S] Information summary
(7) [MG] Multimodal generation: create images, audios, and videos.

The following are examples of tools and applications that could be used for teaching and learning activities. Most are free, but if there is a fee, it would be necessary to work with the organization's instructional management department or for individual teachers to manage the expense of using student licenses and setting up registration management.

(1) **Translation**: DeepL, Google Translate, ChatGPT, Bing and Bard
(2) **Pronunciation practice**: Ondoku-san (ondoku3.com/ja), Microsoft Azure (speech.microsoft.com/audiocontentcreation), Ondoku Chinese (ondoku.org)
(3) **Oral presentation practice**: RESEMBLE.AI (English to Chinese conversion) (www.resemble.ai)
(4) **Dialogue practice**: (1) Text-based dialogue: ChatGPT, (2) Voice-based dialogue: TalkBerry (ChatGPT + GoogleChromeAddOn)
(5) **Image/video creation**: Microsoft Designer (designer.microsoft.com), Google Imagen Video (imagen.research.google/video), Meta Make a Video (makeavideo. studio), Gen-2 (research.runwayml.com/gen2), Stable Diffusion (stablediffusionweb.com), Scribble Diffusion (scribblediffusion.com)

We have recommended the use of such tools for (1) machine translation and (2) speech recognition for text input and pronunciation correction among traditional learning activities. However, they were only used during extracurricular individual learning. To increase the ratio of use in cooperative and autonomous learning within the classroom and realize more efficient activities, it is necessary to consider the optimal teaching methods which allow learners to know which tools to use in which situations, and how to practice their skills.

The following are points to be considered in AI-supported instructional design. Generative AI is still in the early trial-and-error stage of development so teachers must determine which tools are optimal for which tasks. Teachers need to continue to improve the task design and instruction of the most appropriate AI-enabled pedagogical methods through implementation and review of practical data. The cost of learners' low proficiency in tool operation itself will squeeze time for cooperative learning activities and interactive feedback in the classroom. It is thus necessary to improve AI literacy in the form of cross-curricular activities using on-demand videos and flipped learning. Likewise, it is preferable to establish a team-based instructional design and class management system.

6. Conclusion and Future Challenges

This study examined the potential of using generative AI in PBL, which combines foreign language, ICT utilization, and professional education. Seven key areas were identified where generative AI could improve teaching and learning efficiency. However, human teachers are

still needed to provide integrated instruction based on their experience in dealing with each diverse learner. In conversations and collaborative work, teachers must provide pedagogical instruction that fosters autonomous, interactive, and in-depth learning. As well as blended or hybrid ICT-based teaching/learning, the AI-supported instructional design also requires establishing a cross-subject educational system by networking with information course teachers and other advanced educational practitioners. It is essential to reconfirm that teachers are core actors for instructional design, and then recognize how best to allocate teaching time to AI-enabled resources. In addition to that, I believe that it is necessary to maximize the allocation of learning support that only a human teacher can provide.

To test the implications of this study, future studies must add quantitative practical data on implementation of the suggested instructional design. As this field grows, it is vital to see more sustained comparison of the learning process and outcomes between traditional learning methods and activities fully utilizing a generative AI.

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