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Exploration of an integrated instructional design for tourism, cross-cultural understanding, and foreign language education using new technologies

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Abstract:

This action research explores the educational value of integrated Project-Based Learning (PBL) integrating tourism education, foreign language education, and intercultural understanding with Artificial Intelligence (AI), Virtual Reality (VR), and metaverse technologies. This study employed a mixed-methods approach, focusing on qualitative data analysis with seven students in a second-year seminar course. The PBL components included understanding VR concepts, learning about indigenous culture, acquiring VR development skills, team-based development, AI-assisted translation, and presenting outcomes. Findings revealed that this approach fostered a range of skills beyond individual knowledge acquisition, promoting technological literacy and creative expression through collaborative learning. While the use of AI and VR technologies facilitated immersive, multilingual content development, challenges such as technical issues and difficulties in establishing clear themes emerged. The study emphasizes the need for a paradigm shift in education, moving towards learner-centered, technology-enhanced pedagogies, with teachers transitioning to facilitators of learning experiences. Future research should address technical and pedagogical challenges by developing versatile platforms and instructional models integrating new technologies. In conclusion, this integrated PBL approach offers engaging learning experiences, enhancing creativity, technological literacy, intercultural understanding, and multilingual communication, better preparing students for the globalized tourism field.

Introduction

In recent years, there has been a strong demand for tourism human resource development and the promotion of cultural tourism, and initiative policies have been advanced (Agency for Cultural Affairs, 2015; Japan Tourism Agency 'Tourism Human Resource Development Project'). As part of tourism education, there is significant value in having learners become developers of tourism content, searching the unique local characteristics and attractions, constructing multimedia productions, and promoting them to the world multilingually.

This research is a qualitative action research study aimed at exploring the educational value of PBL that integrates tourism education, foreign language education, and intercultural understanding education. The three Research Questions (RQs) were established:

RQ1: What learning activities using AI and VR development comprise the course design of integrated PBL?

RQ2: What are the learning processes and outcomes of this PBL?

RQ3: How can the learning outcomes be evaluated?

Literature review

Tourism research has a multidisciplinary field. The research assessing the potential of VR and metaverse in tourism can be broadly categorized as follows: (1) Applications of VR in tourism (Guttentag, 2010; (Yung & Khoo-Lattimore, 2017). (2) VR in tourism marketing (Huang et al., 2012; Tussyadiah et al., 2018), (3) Multisensory VR experiences (Martins et al., 2017), (4) VR in tourism education (Schott, 2017), (5) The impact of VR on tourist attitudes and behaviors (Huang et al., 2012; Tussyadiah et al., 2018), (6) Virtual field trips for tourism students (Schott, 2017), (7) VR for sustainable tourism (Bec et al., 2021; Guttentag, 2010), and (8) Meta-analysis and literature reviews in VR tourism research (Yung & Khoo-Lattimore, 2017).

This study focuses on the application of VR and metaverse in tourism education, sharing commonalities with categories (1), (4), and (5). Rather than targeting the tourism industry or business as the primary objective, our approach explores the value of utilizing VR and metaverse for multimodal summarization and presentation of outcomes. This is done within the context of inquiry-based learning on tourism themes, from the perspective of language and humanities education. This integrated approach contributes original insights

that extend beyond previous research, bridging the gap between technological applications and educational methodologies in the field of tourism education.

Furthermore, the author has previously conducted educational practices that integrated foreign language learning with multimedia expression and content development. Through PBL rooted in learners' autonomy and local regional needs, we have examined the learning effects of foreign language use and exploring the value of utilizing new technologies in education (Sugie & Fujisaki, 2021; Sugie, 2023).

Methodology

This study adopted a mixed methods approach with an emphasis on qualitative data analysis. The research addressed three main research questions (RQs). As mentioned in the Introduction, RQ1 aimed to summarize the components of instructional design, including activities, environment, tools, and tasks, based on the PBL process. RQ2 focused on categorizing the characteristics of foreign language learning, intercultural understanding, and multimedia expression included in the integrated learning outcomes. RQ3 involved analyzing the responses of an online questionnaire conducted at the time of an end-of-semester presentation session with another university to evaluate the learning outcomes. Based on the results of these inquiries, the study considered the key elements of pedagogical strategies and the potential of integrated PLB for tourism education.

Implementation

Course settings

Seven students (five Japanese and two Malaysian) from the second-year seminar in the Faculty of Humanities enrolled in the course. The course implemented PBL that integrated cross-cultural understanding research, AI-assisted translation activities, and content development using VR and metaverse. The overall theme was "Multilingual Virtual Guide Utilizing VR and Metaverse." Throughout the year, students engaged in learning about Ainu culture (the indigenous people of Hokkaido), conducted fieldwork, participated in workshops on metaverse development techniques, and carried out team-based thematic research and development.

The learning goals were:(1) To utilize resources from the university museum and local ethnic cultures and acquire methods to compile information collected through field

research, (2) To develop skills in multilingual translation using Japanese and the common languages of international students (English and Chinese) with AI assistance, and (3) To practice multimedia expression utilizing VR and metaverse through various Information and Communication Technology (ICT) tools.



Figure 1. PBL Classroom Activities (left: step 1, center: step 2, right: step 3)

Tools and applications

The development took place in the on-campus Creative Lab. This is a studio classroom equipped with gaming PCs and video production environments, where students can work outside of class hours. As the cultural materials introduced in the VR space needed to be translated into multiple languages, Japanese and international students collaborated to improve the efficiency of manuscript creation by utilizing AI tools such as ChatGPT, Google Translate, and DeepL. The main tools used were as follows:

- Tinkercad: Intuitive online 3D modeling (www.tinkercad.com)
- Blender: PC software (free) for detailed 3D modeling (www.blender.jp)
- Poly Haven: Collection of 360° photos, textures, and 3D model resources (polyhaven.com)
- polycam: Creation of 3D objects from 360° photography (smartphone app, PC site) (poly.cam)
- Sketchfab: Collection and sharing of 3D materials (sketchfab.com)
- Monster Mash: Creation of 3D objects from photos or hand-drawn works (montermash.zone)
- Spatial: Metaverse platform (www.spatial.io)

Learning outcomes

Students divided into three teams, each setting a theme related to cultural tourism or cross-cultural understanding and proceeded with development both during class and extracurricular hours.

Team 1: As a result of their Southeast Asian street food research trip, they constructed a space introducing different cultures by arranging 3D objects of photos and English explanations of street stalls, temples, tourist sites, and cuisine from Thailand and Malaysia, based on the students' experiences.

Team 2: Created a space introducing Hokkaido's pioneer era and indigenous culture. They produced 3D scan materials at the university museum. Students created 3D data of Meiji and pioneer era buildings based on photographs and other references.

Team 3: For introducing international cuisine and Japanese food abroad, they initially planned a multilingual guide on Malaysian cuisine and foods of Japanese origin in Malaysia. However, due to teamwork issues, development was delayed, and they ultimately only managed to place Malaysian cuisine in the street food stalls.



Figure 2. VR room development (top left: team 1, bottom center: team 2, top right: team 3)

Results and Discussion

Regarding RQ1, PBL components are organized into the following six learning activities. (1) Understanding the knowledge and concepts of VR and metaverse, (2) Learning about indigenous culture and practicing field research methods, (3) Acquiring VR and metaverse development skills, (4) Team-based development, (5) AI- assisted multilingual translation, (6) Presentation of learning outcomes to internal and external stakeholders.

Regarding RQ2, the elements of foreign language learning involve translating cultural introductions researched and summarized in Japanese. As Japanese is the primary

language used in class, students create texts in Japanese and then use AI tools for multilingual translation. In this case, Chinese and English were used, both being either the native or second language of international students, resulting in AI-generated translations refined through human proofreading. The elements of intercultural understanding are structured around inquiry-based thematic learning based on students' interests. In this instance, the focus was on sociocultural elements that students discovered while researching Southeast Asian street food culture and the history of Hokkaido's development and indigenous culture. The tourism education element involves expressing aspects of intercultural understanding as tourism content using VR and metaverse technologies in a multimodal format. This takes the form of virtual guides introducing tourism resources displayed in galleries in multiple languages, which can also be applied to tourism events such as guide practice sessions for VR space participants and intercultural quizzes.

Regarding RQ3, a remote session was held at the end of the term as an opportunity for presentation and user evaluation, at the same time, an online survey was conducted. The respondents were undergraduate and graduate students (4 undergraduates and 2 graduates) from another university who had experience studying foreign languages and multimedia content development. The survey consisted of questions related to the following areas (Table 1):

Table 1: Survey questionnaire items

No.	Category	Question
Q1	General Presentation	Was the structure of the presentation clear and easy to understand?
Q2	Skills (6-point scale ranging from agree to disagree, including an "unable to judge", same for below)	Did the page explanations and visuals help in understanding the content?
Q3		Did the presenter capture the audience's attention?
Q4	Logical Thinking and Writing (6-point scale)	Were the speech and text logical, with clear arguments? (Regarding Japanese)
Q5		Were the speech and text grammatically correct, using appropriate words and expressions? (Regarding Japanese)
Q6		Were ideas and concepts expressed concisely and accurately?
Q7	Oral speech and Interaction (6-point scale)	Were the tone of voice, speed, and emphasis during the presentation appropriate?
Q8		Were eye contact, facial expressions, and responses to audience reactions appropriate during the presentation?
Q9		Were responses to questions and opinions accurate?
Q10	Research and Information Gathering (6-point scale)	Based on the collected data and information, were the intended scenes effectively constructed and expressed?
Q11		Were the information sources used persuasive and diverse?
Q12		Were the results of research and summaries organized in an easy-to-understand manner?

Q13	Creative and Multimedia Expression (6-point scale)	Was the content original and creative?
Q14		Did multimedia elements (images, audio, video, 3D, etc.) enrich the content?
Q15		Were tools used effectively to enhance the quantity and quality of the final content?
Q16	Overall Feedback (open-ended response)	Please freely write your overall impressions (good points, areas for improvement, questions, comments, etc.).
Q17	Course Evaluation (6-point scale, open-ended response)	Would you like to continue learning foreign languages and humanities using such new technologies in the future?
Q18		Please provide the reason for your answer above.

While the sample size is not sufficient for quantitative data analysis, the evaluations for questions from Q1 to Q15 were generally positive (responses of 4 or 5), with no negative evaluations (responses of 1 or 2). Neutral responses (answer 3) were distributed as follows: Q3 (2 respondents), Q5 (2 respondents), Q6 (1 respondent), Q7 (1 respondent), Q8 (1 respondent and 1 respondent of "Unable to judge/Don't know"), Q9 (1 respondent), Q12 (1 respondent), Q14 (1 respondent) and Q15 (1 respondent). As follow-up interviews were not conducted, the development of targeted improvement strategies based on specific feedback remains for future research.

The following presents the results of qualitative data analysis for Q16 and Q17. Table 2 shows the results of coding the open-ended responses, organizing the elements of learning activities and the constructs of instructional design.

Table 2: Qualitative data analysis for Overall Feedback and Course Evaluation

Category	Conceptual elements of feedback	
	Positive	Negative
General Presentation Skills	Clear and easily audible speech	Difficulty in conveying the theme of expression
	Visually appealing and enjoyable colorful photos	
Logical Thinking and Writing		Insufficient content in introductions, lack of textual explanations
		Difficulty in conveying the theme of expression
Oral speech and Interaction	Clear and easily audible speech	
Research and Information Gathering	High quality of Ainu culture VR space	
	Detailed explanation of VR creation process	
Creative and Multimedia Expression	Visually appealing and enjoyable colorful photos	High PC load and instability due to video processing
	Fresh and easy-to-understand VR experience	
	High quality of Ainu culture VR space	
	Detailed explanation of VR creation	

	process	
	Effective use of links for spatial navigation	
	Realistic and naturally moving character models in VR space	

The presentations and outputs were positively evaluated for their clear and easily audible speech delivery, visually appealing and colorful photographs, and fresh and comprehensible VR experiences. Particularly high marks were given for the high quality of the indigenous culture VR space, detailed explanations of the VR creation process, effective use of links for spatial navigation, and realistic movements of character models placed within the VR space. However, some areas for improvement were noted. These included high PC processing load leading to unstable performance, insufficient content in some presentations (a lack of textual detailed explanations), and difficulty in conveying the main themes of certain expressions.

Finally, we consider the key points of instructional design and teaching strategies for integrated PBL utilizing new technologies. Compared to traditional subject-specific or domain-specific knowledge learning and skill acquisition, integrated PBL showed transformations in several areas: consciousness of thinking skills, awareness through intercultural subjects, proactive learning attitudes of students, positioning and functionality of new technologies such as AI and ICT, and values regarding communication forms and language proficiency.

Creative and Multimedia Expression appears to generate positive value in terms of interest, attention, impression, and understanding of content. However, without the prerequisite skills of theme planning and structuring, research ability, and language expression ability necessary for content development, the value of creative multimodal expression may be significantly diminished.

In this practice, teachers made instructional innovations in areas such as overcoming resistance to student-centered information dissemination, addressing language expression difficulties, overcoming ICT skill disparities through collaborative learning, setting an opportunity for presentation and interacting both inside/outside of the class, and addressing environment-dependent issues. Educational practices utilizing new technologies have long revealed challenges such as environment dependency and lack of technical support. In an era where 5G/6G, Web 3.0, VR, and metaverse become prerequisites for education and learning, issues of network and equipment environment improvement will become more significant.

Regarding teaching strategies that optimally utilize new technologies, the key factors are as follows:

(1) Transformation of teachers' roles and functions

The most critical element is how to promote an educational paradigm shift. Teachers are no longer positioned as omniscient figures unilaterally 'instructing and transmitting' correct answers or ideals. They evolve into facilitators who accompany learners on their journey towards their objectives, engaging in the learning process as advisors and mediators.

(2) Course planning based on instructional design models

Fundamentally, instructional design should be based on learners' needs, knowledge, skills, and environmental prerequisites, necessitating the design and adjustment of class activities, teaching materials, instructional methods, and evaluation (Reigeluth, 1999). It is essential to approach instructional design not by making the acquisition of foreign language operational skills—which is merely the core of communication—the purpose of education and learning. Instead, the approach should focus on "for what purpose and how do learners want to use these skills and create meaning?"

(3) Cultivating and fostering self-education ability

The utilization of new technologies is not merely for assisting with fragmented task execution. It is employed to help learners acquire the ability to learn "how to learn" for themselves, create their own learning environments, and develop the applied skills to continually adjust these environments (Omae et al., 2023). One of the major educational goals will likely be enabling learners to optimize their learning by independently utilizing technology when studying different content in different locations

Conclusion

This study explored the educational value of an integrated PBL composed of tourism education, foreign language education, and intercultural understanding, utilizing new technologies such as AI, VR, and metaverse. The research revealed several key findings and implications for future practices. The integrated PBL approach showed significant potential in fostering a range of skills and competencies. Students engaged in diverse learning activities, from understanding VR and metaverse concepts to conducting field research on humanities and developing multilingual virtual content. This multifaceted approach promoted not only individual knowledge learning or language operational skills but also technological literacy and creative expression through collaborative learning. The use of AI-assisted translation tools and VR/metaverse technologies effectively promoted

content development. Students were able to create immersive, multilingual presentations of cultural and tourism content, enhancing both their language skills and their ability to communicate complex cultural concepts across linguistic boundaries.

However, several challenges remained. Technical issues such as high PC processing loads, the need for more comprehensive development skills, and difficulties in establishing clear theme. This suggested the importance of balancing technological innovation with fundamental research and communication skills.

The research emphasizes the need for a paradigm shift in educational approaches in Humanities. It suggests moving away from traditional instruction such as teacher-centered, lecture-based, segmented teaching/learning towards more immersive, learner-centered, technology-enhanced, integrated pedagogies. The role of teacher is crucial, transitioning from traditional instructors to facilitators and mediators of learning experiences. In addition, this study emphasizes the importance of developing students' self-education abilities. In an era of technology as a precondition for learning, empowering students to create and manage their own learning environment is an important educational goal.

Future research should address technical and pedagogical challenges by developing versatile VR/metaverse platforms, refining AI-assisted language learning tools, and creating instructional models integrating new technologies into tourism, language and humanities education. In conclusion, this instructional design of integrated PBL and new technologies offers opportunities for engaging learning experiences. This approach supports enhancing creativity, technological literacy, intercultural understanding, and multilingual communication, preparing students for the globalized tourism field.

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