Flipped classroom with activity-based learning via the metaverse to enhance English-speaking skills: a case study of Pakse Teacher Training College in Lao PDR

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ABSTRACT: In this study, a flipped classroom method was utilised with activity-based learning (FLC-ABL) via the metaverse to design and develop a tool for self-learning to enhance English-speaking skills of teacher college students in Lao PDR. The aim was to promote self-learning through virtual reality technology with the aid of 3D avatars. The developed system is based on the Spatial.io platform, which can support a variety of presentation formats, enabling users to access information anywhere and anytime in an instant manner. The participants in this study included ten experts from various higher education institutions, derived by means of purposive sampling; and 30 undergraduate sophomore students from Pakse Teacher Training College in Champasack, Lao PDR, derived by means of cluster sampling. The results of this research show that the flipped classroom method with activity-based learning via the metaverse is a learning tool that can be applied for practical use, and it is efficient enough to be used as a tool for self-learning to enhance English-speaking skills.

INTRODUCTION

Education is considered an indispensable element in human society. Due to the current advancement of science and technology, instruction management that can keep up with ever-developing modern technologies is highly important. Accordingly, today's instruction management is focused on the preparation of flexible activities in learning environments and the creation of learning atmosphere that can promote self-learning in order for learners to develop necessary skills in the 21st Century. Also, it is expected that learners will be apply the necessary skills in their daily life, including thinking, collaboration, communication and technology skills which support lifelong learning.

The flipped classroom is an approach to learning where more emphasis is placed on the pre-class preparation of the learner, so that more time can be spent on practical activities during the class. With this teaching approach the learning content is made available on-line before class to allow learners to become familiar with the content on their own before attending the class. This preparation encourages them to be more engaged in the classroom, in a more constructive manner. It is also important that learners should be provided with opportunities to participate in interactive activities, discussions with others, problem solving, and in the application of knowledge obtained from collaboration [1].

Paez-Quinde et al stated that the flipped classroom is an educational approach in which learners can acquire new knowledge outside the classroom, in contrast to the traditional ones in which learning takes place merely in the classroom [2]. In the flipped classroom more emphasis is placed on the learner's preparation for class activities, problem solving and other forms of educational engagement. Ruiz-Jiménez et al highlighted the novelty of the flipped classroom method in which teachers share the pre-selected digital resources and other relevant content with students using digital platforms outside the classroom in an asynchronous manner [3].

Activity-based learning is an important educational approach because it is beneficial to both learners and instructors in many ways. The emphasis on learners' engagement in varied hands-on and interactive activities leads to a learning environment that can fully promote the development of learners' thinking and problem-solving skills.

Activity-based learning focusing on engagement allows learners to create new knowledge and think more broadly about the topics they are learning. Silberman stated that activity-based learning may include goals related to thinking skills, such as critical thinking, problem solving, creative thinking, etc [4]. This will help encourage learners to have a diverse and comprehensive learning experience in terms of both knowledge and life skills.

The metaverse is a new digital technology that refers to a futuristic world, and it focuses mainly on work, study and entertainment in that world. The metaverse is a concept taken from the science fiction novel Snow Crash that was

written by Neal Stephenson. It is a combination of *meta* and *verse*. Users must take the form of an avatar in order to interact with others in a virtual space. Thus, the metaverse is seen as an immersive technology in the environment where people can create their own avatars to participate and interact with others in various activities. The metaverse has been used as a new social communication space, which is a virtual space with high freedom to create and share the immersive learning activities with others. Engagement in the metaverse is regarded as a new experience that offers more benefits than face-to-face learning because it can combine the real-world environments with technologies and then create virtual worlds [5].

English-speaking skills are the abilities to communicate through English words and expressions in an effective and fluent manner. It involves the pronunciation of words, phrases and sentences with an aim to convey ideas, opinions and information to others. In addition to listening, reading and writing skills, speaking is an important language skill that plays a vital role in communication and language proficiency [6].

In reference to the above background, the authors of this article came up with an idea to design and develop a flipped classroom system with activity-based learning (FLC-ABL) system via the metaverse to enhance the English-speaking skills of teacher college students. The system is intended to encourage learners to engage in many activities that require the use of English and expression in the metaverse.

The overall objective of this study was to create a virtual learning experience via the metaverse through, which the learners would be able to enhance their English-speaking skills and feel more confident when communicating in English. In the metaverse, where the real-world environment is combined with digital technologies to create virtual worlds, learning activities can be created and shared among learners who are able to interact with each other through these activities.

This study was focused on the examination of the participants' perspectives towards the design and development of a FLC-ABL system via the metaverse. This examination was conducted to find out if the developed FLC-ABL system was efficient and could be applied to promote and enhance English-speaking skills. Therefore, the overall objective of this study was to develop a learning system capable of promoting and enhancing English-speaking skills, and more specifically, the researchers aimed to:

O1: Synthesise literature on flipped classroom learning, activity-based learning, the metaverse and English-speaking skills;

O2: Develop a FLC-ABL model via the metaverse;

O3: Develop a FLC-ABL system based on the model;

O4: Examine the results of using the FLC-ABL and assess the system's usefulness in English speaking skills' promotion and enhancement.

RESEARCH METHODOLOGY

Research Design

In this study a pre-experimental research method was used with one-shot case study design. The following hypotheses relate to the assessment of suitability and efficiency of the FLC-ABL system to enhance English-speaking skills:

H1: The suitability of the FLC-ABL model via the metaverse is at a high level.

H2: The efficiency of the FLC-ABL system via the metaverse is at a high level.

Participants

The participants in this research included ten experts from various higher education institutions, all of whom were derived by means of purposive sampling and are specialists in the design and development of instruction systems; and 30 undergraduate students derived by means of cluster sampling, all of whom are sophomores of Pakse Teacher Training College in Lao PDR, enrolled in the English Grammar course, Semester 1, academic year 2023. These two groups of participants were well protected under the policy of confidentiality and anonymity.

Research Instruments and Data Collection

The research instruments consist of: 1) the FLC-ABL model via the metaverse; 2) the FLC-ABL system via the metaverse; 3) the evaluation form on the suitability of the FLC-ABL model; and 4) the evaluation form on the quality and efficiency of the FLC-ABL system. The statistics used for data analysis are mean and standard deviation.

For the collection of data, the researchers used the evaluation form, which had already been verified for the index of item-objective congruence (IOC) by experts. Before completing their voluntary assessment on this form, the participants could ask questions until they had a complete understanding about the main goals of this research. Then, the participants were given a clear explanation along with relevant documents with information and evaluation details; and they were free to accept or reject their participation in this research. Above all, they were assured that their identity shall not be revealed.

Method

In order to design and develop the FLC-ABL system via the metaverse, the researchers relied on the concepts of systems approach [7][8] together with the theories of system development life cycle (SDLC), which represent the steps and the process of system development [9]. Thereby, the methodology of this research can be summarised into four stages as below:

Stage 1: Conduct a literature review relevant to flipped classroom learning, activity-based learning, metaverse and English-speaking skills, in order to find out the conceptual framework for this research.

Stage 2: Design a FLC-ABL model via the metaverse. In this stage, the researchers applied the principles of systems approach [7][8] as guidelines for the design and development, which consists of four elements, i.e. input factor, learning process, output and feedback.

Stage 3: Develop the FLC-ABL system via the metaverse. In this part, the researchers relied on the SDLC theories of Roth et al [9] to illustrate the steps and the process of system development.

Stage 4: Examine the results after the participants used the FLC-ABL system via the metaverse. At this stage, all of the participants gave their consent to complete the evaluation form and they were all protected under the policy of confidentiality and anonymity. The average score ranges and the interpretation [10] derived in this stage are shown in Table 1.

Table 1: Average score range and the interpretation of results.

Average score range	Result
4.50-5.00	Suitability is at a very high level
3.50-4.49	Suitability is at a high level
2.50-3.49	Suitability is at a moderate level
1.50-2.49	Suitability is at a low level
1.00-1.49	Suitability is at a very low level

RESULTS

The results of the design and development of the FLC-ABL system via the metaverse are presented below:

Results of the Synthesis of the Conceptual Framework of the FLC-ABL System via the Metaverse

After the literature review on flipped classroom learning, activity-based learning, metaverse and English speaking skills the conceptual framework of this research has been generated as seen in Figure 1.

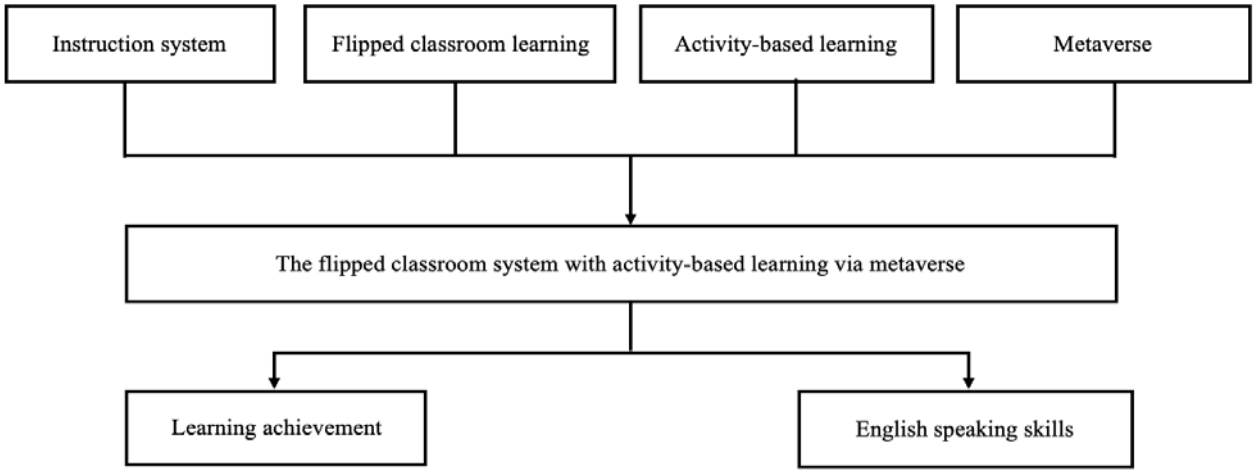


Figure 1: Conceptual framework.

Results of the Design of the FLC-ABL Model via the Metaverse

The FLC-ABL model via the metaverse is a research tool that can facilitate learner-centred instruction management. Learners are able to learn lessons from instruction videos and then study, think and analyse the content on their own at home before activities with other students in class. At that time, instructors are responsible for giving suggestions and facilitating learning management with an attempt to promote learners' English-speaking skills. As illustrated in Figure 2, the design of the FLC-ABL model is based on a systems approach [7][8], which consists of four elements, i.e. input factor, learning process, output and feedback.

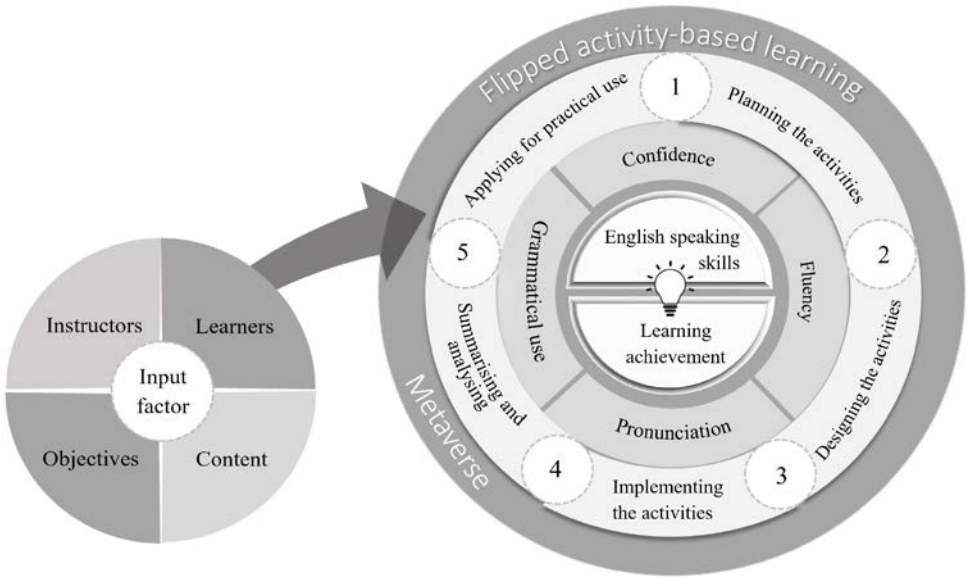


Figure 2: The FLC-ABL model via the metaverse.

According to Figure 2, the components of the FLC-ABL model are as follows:

- Input factor: This represents all the elements related to the design of the FLC-ABL via the metaverse, including analysis on user characteristics (learners and instructors), learning objectives, content and the metaverse.
- Flipped activity-based learning process via the metaverse: This refers to the learning process within the FLC-ABL model. It is a learner-centred instruction management, in which learners are engaged in activities with other students via the Spatial.io platform in the form of metaverse. Regarding the steps used to support on-line learning, the researchers employed the five-step flipped activity-based learning process of Thayniath [11], and Sithsungnoen and Chanintharabhum [12], which consists of: 1) planning the activities; 2) designing the activities; 3) implementing the activities; 4) summarising and analysing the results; and 5) applying for practical use, respectively.
- Output: This refers to the results acquired from the learning process; in other words, it refers to English-speaking skills [13-15]. The characteristics chosen for consideration are communication with confidence, fluency in language usage, pronunciation ability, and the grammatical use of the language.
- Feedback: This refers to the data gained from the output to be used as feedback in order to improve the learning process. The feedback herein consists of the results of measurement on English-speaking skills and the opinions of the experts.

Table 2: Evaluation results of the suitability of the FLC-ABL model (overall elements).

Items for evaluation		Mean	SD	Suitability
1. The FLC-ABL model is in line with the research objectives		4.80	0.45	Very high
2. Elements of the FLC-ABL model	Input	5.00	0.00	Very high
	Flipped activity-based learning process	5.00	0.00	Very high
	Output	5.00	0.00	Very high
	Feedback	5.00	0.00	Very high
3. The ordering of elements of the FLC-ABL model is clear and consistent		4.40	0.55	High
4. Each element corresponds to each other		4.80	0.45	Very high
5. The ordering of elements of the FLC-ABL model is suitable and easy to understand		4.40	0.55	High
6. Overall elements of the FLC-ABL model are complete, comprehensive and compliant with the research objectives		4.60	0.55	Very high
Average score		4.78	0.42	Very high

Considering the results of suitability evaluation in Table 2, it can be seen that the average score in all aspects of the FLC-ABL model is at a very high level (mean = 4.78, SD = 0.42). It is evident that the FLC-ABL model contains appropriate elements and it can be applied as a guideline to further development of the FLC-ABL model via the metaverse.

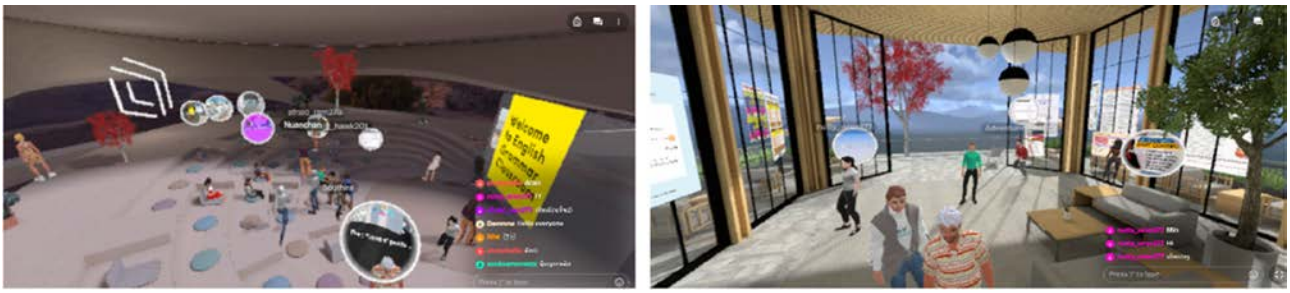
Table 3: Evaluation results of the suitability of the FLC-ABL model.

Items for evaluation		Mean	SD	Suitability
Input factor	Analysis of learners	5.00	0.00	Very high
	Analysis of instructors	5.00	0.00	Very high
	Learning objectives	5.00	0.00	Very high
	Content	5.00	0.00	Very high
	Metaverse	5.00	0.00	Very high
Flipped activity-based learning process via the metaverse	Flipped classroom learning process	5.00	0.00	Very high
	Activity-based learning process via metaverse sequencing	5.00	0.00	Very high
Output	English-speaking skills	4.80	0.45	Very high
Feedback	Results of measurement on English-speaking skills	5.00	0.00	Very high
	Opinions of the experts	5.00	0.00	Very high
Average score		4.98	0.14	Very high

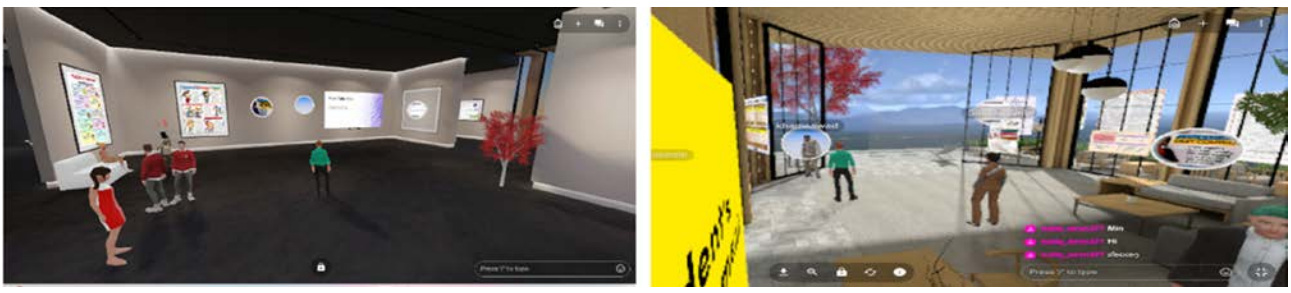
In reference to the results of suitability evaluation in Table 3, it can be seen that the average score in all aspects of the FLC-ABL model is at a very high level (mean = 4.98, SD = 0.14). It evident that the FLC-ABL model consists of appropriate elements and it can be used as a guideline to further development - as indicated above. This is in line with the research of Parati et al, who mentioned that the application of the flipped classroom learning process in learning management, which is considered an educational approach providing students with new knowledge outside the classroom, can promote positive learning in terms of second language education and improvement in English language learning, which is highly important in the Malaysian education system [16].

Results of the Development of the FLC-ABL System via the Metaverse

The FLC-ABL system via the metaverse is compatible with various interactive screens (responsive Web design) on the Spatial.io platform, which can support a variety of presentation formats, e.g. texts, images, animations and links on Web sites, enabling users to access information anywhere and anytime in an instant manner. In this stage, after designing the interactive screen that can satisfy the needs of users, as well as the structure and elements consistent with the learning content in the English Grammar course, the researchers also incorporated appropriate learning technologies via the metaverse with an intention to provide learners with new experiences. It is believed that such new experiences can encourage users to achieve self-learning. After that, the researchers asked the participants, who are undergraduate students of Pakse Teacher Training College in Champasack, Lao PDR, to use the FLC-ABL system (Figure 3a-Figure 3d) and examined the usage results.



3a)



3b)

3c)

3d)

Figure 3: The FLC-ABL system via the metaverse: a case study on Pakse Teacher Training College in Champasack, Lao PDR.

Table 4 below presents the evaluation results of the FLC-ABL system's users.

Table 4: Evaluation results of the FLC-ABL system's users.

Aspect	Items for evaluation	Mean	SD
Quality	1. The FLC-ABL system is convenient and easy to understand.	4.60	0.55
	2. The content is appropriate and consistent with the learning objectives.	4.20	0.84
	3. The activities are clear and easy to understand.	4.60	0.55
	4. The equipment and the instruction media are sufficient and suitable for the activities.	4.20	0.45
	5. The learning objectives and goals are clear and appropriate.	4.60	0.55
	6. The activity content is diversified and consistent with the learning objectives.	4.80	0.45
	7. The links are valid and correct.	4.40	0.55
	8. The presentation is accurate and fast.	4.20	0.84
	9. The FLC-ABL system can use technologies and media.	4.80	0.45
	10. The FLC-ABL system can create the learning process focusing on flipped classroom.	4.40	0.55
	11. The FLC-ABL system can be applied in a sustainable manner.	4.60	0.55
	12. Referring to overall quality, the FLC-ABL system covers all demands.	4.40	0.55
Efficiency	13. The design of learning activities is consistent with the learning content.	4.80	0.45
	14. The FLC-ABL system can promote the use of the metaverse to enhance English-speaking skills.	4.60	0.55
	15. The system tools can respond continuously.	4.40	0.55
	16. The design is creative.	4.60	0.89
	17. The FLC-ABL system contains useful and effective resources for promoting English-speaking skills.	4.60	0.55
	18. Referring to overall efficiency, the FLC-ABL system covers all demands.	4.40	0.89
Practical use	19. The FLC-ABL system can promote the 21st Century learning skills.	4.60	0.55
	20. The FLC-ABL system contains learning activities that are consistent with the learning objectives.	4.40	0.55
	21. The FLC-ABL system contains elements that are consistent with the social context and current technologies.	4.60	0.55
	22. The FLC-ABL system is likely to be applied for practical use.	4.40	0.89
Average score		4.51	0.59

As can be seen in Table 4, the average score in all three aspects (quality, efficiency and practical use) is at a very high level (mean = 4.51, SD = 0.59). It is obvious that the FLC-ABL system via the metaverse is a learning tool that can be

applied for practical use, and it is efficient enough to be used as a tool for self-learning to enhance English-speaking skills. This is because the system contains technologies and digital tools that can support learning and satisfy the needs of learners. This is in accordance with the research of Chen and Lee, who said that the use of the metaverse in the e-learning system can lead to numerous benefits in learning [17]. Besides, it was found in this study that the development of platforms in the metaverse can result in more effective learning and can promote the learning process in a virtual environment. This finding is in line with the research of Raman et al, who stated that the integration of virtual reality technology into education can improve English communication skills and increase digital literacy, while helping learners to be well prepared for the technologies of the future [18].

CONCLUSIONS

In summary, effective English communication skills are of great importance in education and employment of university students in the Lao People's Democratic Republic. The integration of virtual world technologies with learning processes and learning activities, both in and outside the classroom, is seen as one of the biggest initiatives of educators to enhance the communication skills of learners. This study emphasises learners' engagement, motivations and self-directed learning with an attempt to upgrade English communication skills. The learning activities were designed and developed through the Spatial.io platform that can support a variety of presentation formats. Above all, the design and development of the system also involved appropriate learning technologies via the metaverse in order to provide learners with new experiences that can further lead to self-learning.

This study has some limitations due to the small number of participants, and it is only a case study for a specific group. Therefore, to acquire more reliable results, a study should be conducted with more diverse research participants. Moreover, the researchers should also monitor the use of the FLC-ABL system in a continuous manner, and examine the skills that have influence on the use of educational technology. All of this should lead to further development of the FLC-ABL system and its guidelines, so that the system becomes more effective and consistent with the needs of its users.

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