Design and Implementation of a Learning Model via VRT for Amplifying Interpersonal Communication Skills among Undergraduate Students

[1]Hui Qiang, [2]Jitra Dudsdeemaytha, and [3]Pasana Chularut

Srinakharinwirot University, Thailand

E-mail: huiqiang0755@163.com[1], jitra@g.swu.ac.th[2], pasana@g.swu.ac.th[3]

Received March 19, 2024; **Revised** April 30, 2024**; Accepted** May 8, 2024

Abstract

International organizations such as the Organization for Economic Cooperation and Development (OECD) and many education experts believe that communication skills are one of the most important for undergraduate students. Good communication skills are crucial for their healthy growth, social adaptation, and career success. However, the current status of communication skills for Chinese undergraduates is not optimistic; therefore, researchers are trying to develop a virtual contextual learning model to improve students' communication skills. This paper aimed to study (1) the definition of communication skills and their components; (2) the development of a learning model through virtual reality technology (hereinafter referred to as VRT) to improve communication skills; and (3) the effectiveness of the learning model in improving undergraduate students' communication skills as assessed through VR testing. This study was quantitative research. A sample of this study consisted of 50 students in Class 1 of the 2023 undergraduate law major at the School of Political Science and Law, Zhoukou Normal University, Henan Province. The multi-stage sampling method selected them, and the questionnaire on communication skills of college students served as the collection tool. The researchers reviewed the literature on communication theory, VR theory, problem-based learning theory (hereinafter referred to as PBL), and constructivist theory and designed a learning model based on VRT by combining the results of semi-structured interviews with five teachers. After the experiment concluded, the researchers analyzed the data using a combination of descriptive statistics and content analysis. The results of the study were as follows:

1. Undergraduate students' communication skills refer to the ability necessary for them to exchange information with others in a comprehensive manner through verbal and nonverbal means in order to establish good interpersonal relationships smoothly and effectively. The main components of Chinese undergraduates' communication skills were their ability to express, listen, understand, and control emotions.

2. Based on VRT theory, PBL learning theory, and constructivist theory, a learning model related to communication skills can be constructed.

3. The learning model constructed in this study was effective in improving undergraduate students' communication skills.

Keywords: Communication skills; Undergraduate students Learning model; Virtual Reality Technology

Introduction

Where there is human activity, there is communication (Saputra, 2021). According to the OECD, the ability to communicate is one of the most important skills of all competencies, and effective communication and proper coordination in diverse teams is the key to success in many jobs (OECD, 2019). Educational experts maintain that learning in the 21st century is more than just the traditional 3Rs (reading, writing, and arithmetic), and should focus on the importance of critical thinking, creativity, collaboration, and communication – skills that are vital for students to thrive in the 21st century (Liego, 2022). Research has found that communication skills are closely related to students' academic achievement, future career development, and happy life (Kang et al., 2020). People with good communication skills are happier, healthier, enjoy more satisfying relationships, and perform better in school and at work (Wagner, 2015; Adler, Procot, 2017; Lai et al., 2017). Communication skills are so important for college students, but the current state of communication proficiency among them is not encouraging. Teachers in universities generally believe that current Chinese undergraduates have a narrower scope of communication, lack communication experience, are not good at talking to people, and do not even achieve real emotional communication among classmates. When encountering conflicts that need to be reconciled, good communication skills can lead to a smoother resolution of the conflict, while poor communication or lack of communication can lead to the deterioration of the conflict and thus lead to a crisis in interpersonal relationships (Wang, 2020). Therefore, improving the communication skills of undergraduates is an issue worth studying and also a concern for researchers.

Currently, most of the research on improving undergraduate students' communication skills focuses on the opening of new paths in real-life scenarios, such as focusing on students' mental health, giving full play to the nurturing function of teachers and schools, and strengthening the interaction between teachers and students, while there is a lack of research on constructing a teaching model in a virtual scenario. One of the researchers is a teacher engaged in curriculum research and development at Zhoukou Normal University in Henan Province, and has long been engaged in research on undergraduate education. The college where the researcher works has a virtual reality training platform that can accommodate 100 people to participate at the same time, and the researcher is proficient in operating the virtual training system. Therefore, this study attempts to construct a VRT-based learning model to improve the communication skills of college students.

The researchers conducted semi-structured interviews with five award-winning teachers in the Teaching Skills Competition of Higher Education Institutions in Henan Province. Based on the results of the interviews, the researchers concluded that undergraduate communication competence is necessary for undergraduates to communicate comprehensive information with others through the use of verbal and non-verbal means, so as to smoothly and effectively build up a good interpersonal relationship. The communication skills of Chinese undergraduate students mainly consists of four factors: expression skills, listening skills, understanding skills, and emotional control skills. Based on this, the researchers expect to develop a learning model that combines certain learning theories to provide a reference for improving undergraduate communicative skills.

Research objectives

1.Study the definition, components of communication skills in undergraduate students;

2.The development of learning model through VRT for enhancing communication skills;

3. Assess the effectiveness of the learning model through VRT for enhancing communication skills of undergraduate students.

Literature Review

A teaching model is an assemblage of concepts anchored in a specific theory of learning, comprising select components and their connections, with a specific ideological basis, all of which can steer the learning process, strategy development, and actual application (Tyler, 2013). Some investigators opine that learning models are an explicit teaching method (Eggen & Kauchak, 2012),

which encompasses teaching components like films, texts, programs, and courses (Joyce et al., 2009). Some believe it's a distinct format derived from learning theories or pedagogical framework to facilitate students to attain educational objectives, encompassing learning environment configurations and interactive processes to enhance student performance (Dakhi et al., 2020).

The theoretical basis for the learning model developed in this study includes communication theory, VR theory, PBL, and constructivist theory. PBL is a student-centered learning method that utilizes real-life problems to initiate the learning process and cultivate students' problem-solving skills. It is an approach to learning that uses problem modelling to encourage students to learn by applying problems in analysing and solving problems to find the best solution possible.

Constructivist theory assumes that individuals or learners do not acquire knowledge and understanding through passive perception of knowledge and understanding in the immediate process of knowledge transmission, but rather through experience and social discourse, integrating new information to construct new understanding and knowledge. Through constructivist pedagogical methods such as problem solving, group work and open discussion, students are able to communicate and co-construct knowledge and understanding with others.

VRT is a human-computer interaction technology (Tussyadiah et al., 2018). It has significant advantages in communication skills training due to its "3I" characteristics of immersion, interaction, and imagination. The most shining point of VR is its ability to integrate with various industries and fields in society. In the field of education, it can be integrated with subjects such as culture, literature, and art, allowing students to achieve overall quality improvement (Gao, 2022). Virtual reality enables users to participate in computer-generated environments, which are supported by computer graphics systems and utilize various display and interface devices, providing teachers with various teaching methods and tools (Gudoniene & Rutkauskiene, 2019).

Currently, research on the effects of VRT on communication ability has mainly focused on the medical field and special populations, and there are relatively few studies on the effects of VRT on the communication ability of undergraduates, and this study will fill this gap. The researchers attempted to develop a VRT-based learning model in order to provide a strategic reference for improving students' communication competence. The most important elements that affect undergraduates' communication competence include expression, listening, comprehension,

and emotion control, so the learning model developed in this study will assess Chinese undergraduates' communication competence in these four domains.

In summary, this study used communication theory, VR theory, PBL and constructivist theory to construct a learning model which will be used to improve undergraduate students' communication skills.

Conceptual Framework

This study aims to investigate the effectiveness of VRT based learning models in improving students' communication skills. The author designed learning models based on VRT theory, communication theory, PBL theory, and constructivist learning theory. The conceptual framework of the study is as follows:

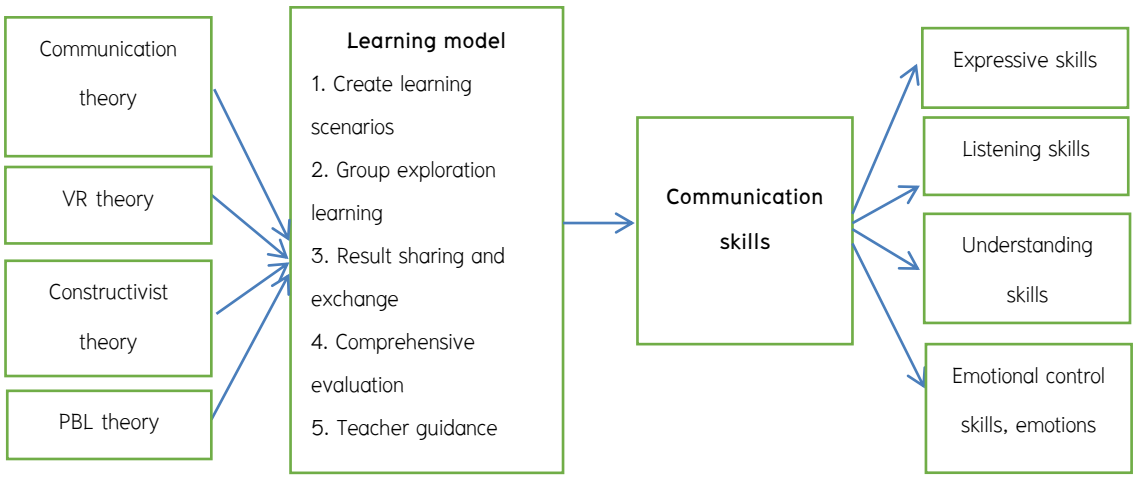


Figure 1 The conceptual framework

Research Methodology

Step 1: Study relevant literature

In this study, the researchers searched through China National Knowledge Infrastructure (CNKI), Wipo data, Wanfang data, Hong Kong Academic Literature Database platform, the literature search platform of the library of Srinakharinwirot University in Thailand and the collection of books and journals in the library of Zhoukou Normal University, as well as several websites of the Chinese education department related to academic research, using the words "communication competence" as a search term to obtain relevant literature on communication competence at home and abroad. The researchers combined the problems found in the literature study and used

it as a basis to make a good framework for the interview questions, and planned to explore in depth the definition and components of undergraduate students' communication competence.

Step 2: Conduct semi-structured interviews with teachers

In the process of designing a learning model for improving students' communication skills, it is extremely important to collect the views of frontline teachers in their teaching practice. In order to encourage them to provide more useful information for the qualitative study, to practically understand college teachers' views on the current situation of undergraduate communication competence, and to find a path to improve students' communication competence, the researchers conducted semi-structured interviews with five teachers who had won the prize of Teaching Skills Competition for College Teachers in Henan Province.

The interview questions are anchored to the research objectives: 1) the definition and basic elements of undergraduate communication skill; 2) the development of a survey instrument to assess undergraduate communication skills; 3) the design of a VRT-based learning model to improve students' communication skills.

Step 3: Develop research instruments

1. Construct a survey instrument to assess undergraduate communication skills

Based on literature review and teachers' interviews, the researchers posits that communication ability is the ability necessary for undergraduates to exchange information with others in a full range of ways through the use of verbal and non-verbal means, in order to establish good interpersonal relationships smoothly and effectively. Chinese undergraduates' communication competence is mainly composed of four factors: expression, listening, understanding and emotion control.

Based on the teachers' suggestions, the researchers designed sixteen questions according to the four components of communication competence, four questions for each component. Each question presented a statement of some fact in the first person, and each question was designed with five options, and the student being tested was asked to choose himself/herself according to the situation described in that question (very much in line / somewhat in line / unable to say for sure / not quite in line / very much out of line).

2. Evaluate the questionnaires

Reliability and validity are two fundamental benchmarks in qualitative research. To examine the reliability and validity of the questionnaires, data collection and testing were executed on non-experimental class students. The target population comprises 50 students from Class 2 of

the 2023 law major at Zhoukou Normal University, who share the same school, major, and level as the experimental group in another parallel class.

Upon data collection, the researchers imported the acquired 50 samples into SPSS for reliability and validity testing. The test results are shown in the table below:

Evaluation at a glance	Results (N=50)			
	Mean	S.D.	Reliability	Validity
Expressive skills	3.13	1.207		
Listening skills	2.97	1.165		
Understanding skills	2.15	0.878	0.782	0.707
Emotional control skills	3.25	1.079		
Overall performance	11.33	2.082		

After analyzing the test data, it was found that the reliability of the project was greater than 0.70 and the validity of the project was greater than 0.7. The analysis of the data showed that the questionnaire quality was good and could be used for formal testing.

Step 4: Develop a learning model

1. Participants

In terms of participant selection, the author used a multi-stage sampling method to select 50 students from Class 1 of Law, 2023, School of Political Science and Law, Zhoukou Normal University as participants.

2. Steps for designing a learning model

1) According to the suggestion of conducting semi-structured interviews with 5 award-winning teachers in the Teaching Skills Competition of Henan Province's universities, this learning model will be implemented for a total of 6 weeks, once a week, with two class hours each time. The learning model designed by the author consists of five steps: creating learning situations, exploring learning in groups, sharing and commenting on achievements, comprehensive evaluation, and teacher guidance. The first four steps are the specific implementation, and the last step, i.e. teacher guidance, runs through these four steps as illustrated in the following figure.

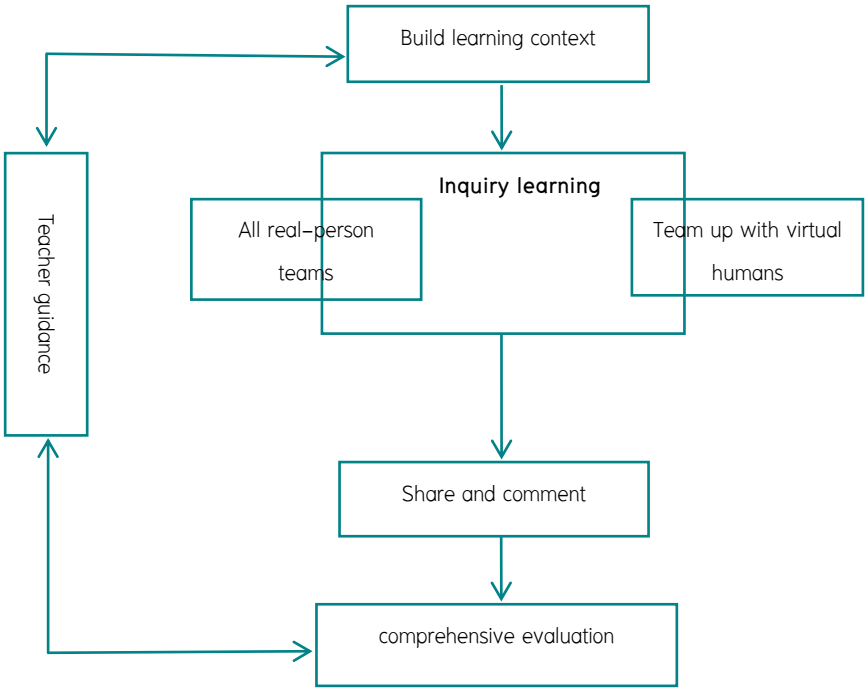


Figure 2 Learning model

2) The researchers invited experts to conduct quality checks on the learning model. The consistency and applicability evaluation of the learning model is conducted by 5 experts (2 legal experts and 3 educational experts). The experts checked the consistency and applicability of the various components of the learning model. After collecting the data, the researchers analyzed and evaluated it. The consistency evaluation results showed that the Project Objective Consistency Index (IOC) was between 0.6 and 1.0, higher than the standard (0.5), which means that each component of the learning model evaluated by experts is consistent with each other. The applicability evaluation results show that the average score is between 3.8 and 4.8, and the standard deviation is between 0.447 and 0.894. The average score of the applicability of the learning model is higher than 3.51, which is at a high level. The components of the expert evaluated applicability learning model have good suitability.

Step 5: Data Collection and Analysis

The researchers has implemented a VRT-based learning model to improve undergraduate communication skills in Class 1 of 2023 law major, School of Political Science and Law, Zhoukou Normal University, spanning a duration of 6 weeks, once weekly, with two academic sessions each instance. Before and after the implementation of the learning model, the researchers

conducted a communication skill test on all students in the class. The survey questionnaire was divided into four parts based on the four important factors of communication skill: expression ability, listening ability, understanding ability, and emotional control ability. Each part had four questions, with a maximum score of 5 points for each question. 50 students from Class 1 participated in the test, with a participation rate of 100%. 50 test papers were collected, including 50 valid ones, with a validate rate of 100%. SPSS statistical software was used to execute pre- and post-assessments on students' verbal communication competencies and executed descriptive statistics. The average score, standard deviation (SD), and level are shown in the table below:

Evaluation at a glance	Results (N=50)				T	P
	Pre-test		Post-test			
	Mean	S.D	Mean	S.D		
Expressive skills	2.87	0.71	3.40	0.57	5.10	0.000
Listening skills	2.83	0.60	3.21	0.67	3.67	0.001
Understanding skills	2.06	0.59	2.51	0.60	4.74	0.000
Emotional control skills	2.90	0.64	3.53	0.65	5.87	0.000
Overall performance	10.65	1.63	12.65	1.50	9.27	0.000

From the above table, it can be seen that the average score of students' communication skill before the test is 10.65 points, with a standard deviation of 1.63 points. After implementing the learning model, the average score of the post test increased to 12.65 points, with a standard deviation of 1.50 points. The significant increase in post-test scores compared to pretest scores indicates a notable improvement in students' communication skills after undergoing the VRT learning model intervention. This improvement is further supported by the calculated t-value of 9.27, which is statistically significant at $p < .05$, indicating that there was a significant correlation between pre-test scores and post-test scores.

Moreover, as shown in the table above, the average scores of expression ability, listening ability, understanding ability, and emotion control ability after the experiment were all higher than before, with corresponding t-values of 5.10, 3.67, 4.74, and 5.87, respectively, and the corresponding p-values were all less than 0.001, indicating that this learning model is also significantly effective in improving various aspects of students' communication skill.

Step 6: Student interview after implementing the learning model

Upon completion of the VRT learning model, five students from the experimental class were selected at random for interviews to explore and dissect their sentiments after the deployment of the VRT learning model.

Students generally agreed that the merits of the VRT learning model were that the constructed situations were more realistic and the operation was more free. Students believe that the VRT learning model is more immersive than the traditional learning model. They have found the joy of this course and were able to remember the operations and knowledge effectively. In the VRT learning model, they can regulate the extent of the field of view, acquire a comprehensive understanding of the intricacies of the scenario, and have a deeper memory of the knowledge points.

Students maintain that adopting the VRT learning model can not only improve their communication skills but also increase their interest in learning. All five students interviewed agree that the VRT learning model is beneficial for learning and aspire to continuing using this approach in future classes. They also propose integrating VRT into teaching and learning activities in other subjects.

Research Results

Objective 1. The results show that undergraduate communicative competence refers to the ability necessary for undergraduates to exchange information with others in a full range of ways through the use of verbal and nonverbal means, in order to establish good interpersonal relationships smoothly and effectively. Chinese undergraduates' communicative competence mainly includes four aspects: expression, listening, understanding and emotional control.

Objective 2. The results show that it is possible to construct a VRT-based learning model for improving communication skills.

Objective 3. The results show that there is a significant improvement in the communication skills of the undergraduate students after the implementation of the learning model in this study, which proves the effectiveness of the learning model.

Discussions

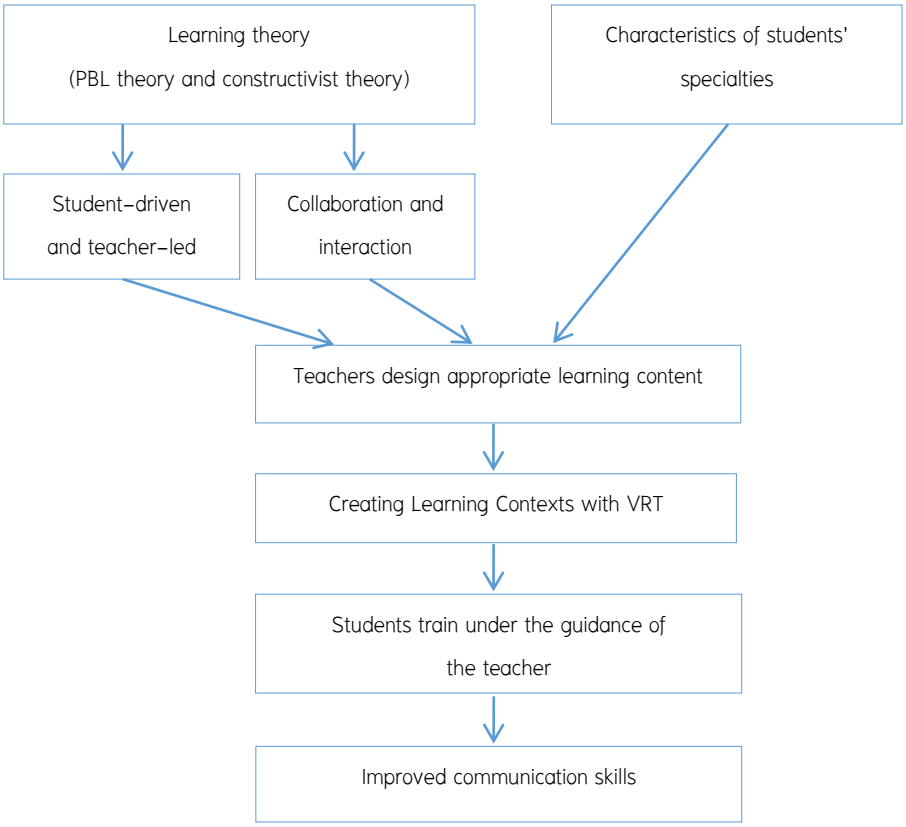
A learning model is a distinct teaching methodology (Eggen & Kauchak, 2012) that encompasses learning environmental configurations and interactive processes to assist students in attaining superior learning outcomes (Dakhi et al., 2020). PBL is a student–centered teaching methodology (Hmelo–Silver, 2004), and It has four main pedagogical ideas: the teacher asks questions before the lesson; the students look for information; the group discussion; the teacher summarizes (Savin, 2000). Collaborative problem–solving groups are a key feature of PBL, as group discussions and debates stimulate problem–solving and high–level thinking. Hence, PBL also enables students to practice multiple forms of thinking skills including communication thinking and collaborative thinking (Yusof et al., 2016). These theories provide important references for this study to construct the learning model of "creating a learning context, group inquiry learning, sharing and commenting on results, comprehensive evaluation, and teacher guidance".

VRT provides the necessary technological aids in terms of deeper integration of constructivist theory and teaching practice. Students are able to better manage and monitor their learning process while improving their communication and knowledge construction skills when using the tools of VRT (Azevedo, 2018). The interactive and communicative features of the system provide students with opportunities to interact and collaborate with teachers and peers, thus promoting constructivist learning and communication skills (Olagbaju & Popoola, 2020). The experimental results of this study are consistent with these theories: the researcher used the VRT learning model to teach Class 1 of 2023 law major in the School of Political Science and Law at Zhoukou Normal University, and after one and a half months of implementation, the undergraduate students who participated in the learning model experiment showed improvements in their ability to express themselves, their ability to listen, their ability to understand, and their ability to control their emotions, and the students' ability to communicate was significantly improved.

Moreover, the most commendable attribute of VRT is its capability to integrate with various industries and fields in the society, which means that the education of VR should be integrated with the subject curricula so that the students can get the overall quality enhancement (Gao, 2022). In a VR–based blended flipped classroom, students can have in–depth communication and interaction with teachers or peers (Xiao & Hong, 2020). According to post–experimental interviews with students about their experiences, the use of this learning mode not only improved their communication skills, but also significantly increased their interest in learning.

New knowledge

This study produced the following new knowledge:



Constructing the learning context is the most basic and core link in the development of learning mode, PBL theory and constructivist theory provide the theoretical basis for constructing the learning context with students as the main body and the teacher as the guide, collaborative and interactive, but the teacher must combine with the characteristics of the profession to carry out the design suitable for students.

The introduction of VRT into the learning model can solve the problem of many people carrying out multiple training at the same time, so that each student can get full and effective exercise in a relatively short period of time, which saves a very large amount of teaching time and greatly improves the training efficiency.

The learning mode allows students to continue to use it repeatedly and independently after the experiment is over, constantly improving their communication skills.

Conclusion

This experimentation demonstrated the effectiveness of developing a VRT-based learning model in improving undergraduate students' communication skills. This result validates the effective combination of PBL, constructivist theory, and VRT in improving communication skills, which helps to fill the current research gap.

Suggestions

Based on the results of this study, the following recommendations can be proposed: 1) The learning model constructed in this study can be used directly or referenced for use by teachers in other colleges or university in their teaching; 2) Universities and colleges can obtain a program to improve undergraduate students' communication skills, permitting more teachers to intervene in students' learning situation to improve their communication skills; 3) When applying the learning model in distinct subjects, teachers should design tasks contextualized to the features of the subject and the characteristics of students, so that the tasks are accessible and appropriate, and students will not harbor fear of losing interest in learning, nor will it be oversimplified and lead to poor learning outcomes.

References

Azevedo, R. (2018). Using hypermedia as a metacognitive tool for enhancing student learning? The role of self-regulated learning. In *Educational psychologist* (pp. 199-209). Routledge.

Dakhi, O., JAMA, J., & IRFAN, D. (2020). Blended learning: A 21st century learning model at college. *International Journal of Multi Science, 1*(8), 50-65.

Eggen, P., & Kauchak, D. (2012). *Strategi dan Model Pembelajaran. Mengajarkan Konten dan Keterampilan Berpikir.* Translated by Satrio Wahono. Jakarta: Indeks. 2012.

Gao, Z.P. (2022). The current situation and comparative analysis of virtual reality majors in Chinese and American Universities. *Advancements in Education, 12,* 5225.

Gong, X. (2019). *A survey on interpersonal communication skills of master's students in science and engineering*(Master's), Huazhong University of Science and Technology.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn?. *Educational Psychology Review, 16,* 235-266.

Joyce, B.R., Weil, M., & Calhoun, E. (2009). *Model of teaching.* (8th ed.). Pearson.

Kang, C.P., Xu G.X., Wei, R., Liu, J., Zheng, Y., Liu, Y., Gan Q.L., & Ma, L.H. (2020). Communication literacy: The fourth 5C model of 21st century core literacy. *Journal of East China Normal University (Education Science Edition), 38*(2), 71–82

Lai, E., DiCerbo, K., & Foltz, P. (2017). S*kills for today: What we know about teaching and assessing collaboration.* Pearson.

Liego, M. A. (2022). *21st–Century learning: What it is and why it's important*. TeacherPH. Retrieved September 14, 2022, from https://www.teacherph.com/21st–century–learning/

Olagbaju, O. O., & Popoola, A. G. (2020). Effects of audio–visual social media resources–supported instruction on learning outcomes in reading. *International Journal of Technology in Education, 3*(2), 92–104.

Organization for Economic Cooperation and Development (OECD). (2019). *Future world youth action guide: how PISA assesses global competency*. Beijing Normal University Press.

Saputra, F. (2021). Leadership, communication, and work motivation in determining the success of professional organizations. *Journal of Law, Politic and Humanities, 1*(2), 59–70.

Savin–Baden, M. (2007). Challenging models and perspectives of problem–based learning. In *Management of Change* (pp. 9–29). Brill.

Tussyadiah, I.P., Wang, D., Jung, T.H., & Tom Dieck, M.C. (2018). Virtual reality, presence, and attitude change: Empirical evidence from tourism. *Tourism management, 66,* 140–154.

Tyler, R. W. (2013). *Basic principles of curriculum and instruction.* University of Chicago Press.

Wang, J.Y. (2020). The crisis of interpersonal relationships among college students caused by dormitory conflicts and its solutions. L*iterary Education (Part 2), 495*(1), 164–165.

Xiao, D.L., & Hong,H.C. (2020). Research on VR–supported flipped classroom based on blended learning—a case study in "learning English through news.". *International Journal of Information and Education Technology, 10*(2), 104–109.

Yusof, K. M., Sadikin, A. N., Phang, F. A., & Aziz, A. A. (2016). Instilling professional skills and sustainable development through Problem–Based Learning (PBL) among first year engineering students. *International Journal of Engineering Education, 32*(1), 333–347.