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Original Paper

A Literature Review of Virtual Reality in Interpreting Teaching (2012-2023)

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Abstract

As an important content of metaverse, the integration of virtual reality technology with interpreting teaching has attracted increasingly attention in the field of interpreting research. By screening major journals and databases, based on the application of 19 virtual reality technologies in interpreting teaching in recent 11 years, by a combination of quantitative and qualitative research methods, from five aspects: publication trends, research topics, researchers and levels, research areas, and the design and development of the virtual reality platform, this paper formed an coding analytical framework for a systematic literature review of the application of virtual reality technology in interpreting teaching. Through content analysis to conduct a systematic literature review, it aims to systematically analyze the development trend, hot research topics and mainstream research methods of virtual reality technology applied in interpreting teaching in the past 11 years, and then summarize its research direction and the use of the platform, finally give the problems and suggestions.

Keywords

Virtual Reality, Interpreting Teaching, literature review, content analysis

1. Introduction

In the field of interpreting teaching and research, the use of virtual reality (Virtual-Reality) technology, as a form of "Computer-Aided Interpreting Teaching (CAIT)", has increasingly attracted the attention of interpreting educators, scholars and practitioners. Virtual reality creates a virtual environment through a computer, through vision, hearing, touch, smell and other functions, to break through the limitation of time and space, so that users have the same feeling as in reality (Liu, 2018, p. 79).

"The application and discussion of virtual reality technology in the field of interpreting teaching is limited to a few projects such as the European Commission's" virtual reality interpreting "and the Virtual School of the University of Geneva". In China, the relevant research is even more backward

and limited to the introduction of relevant foreign research" (Deng et al., 2018, p. 92). In recent years, research and abroad, but systematic literature review is lacking. The research through the domestic and foreign major journals and database screening, and the content analysis method of nearly 11 years domestic and foreign related research systematic literature review, to system combing nearly 11 years of virtual reality technology applied to the development trend of interpreting teaching, hot research topic and mainstream research methods, summarizes the research direction.

2. Literature Review

2.1 Virtual Reality Technology

The development of science and technology promotes the combination of technology and teaching (Wang & Li, 2022). In the 1960s, the University of Illinois's Plato Plan (PLATO) began machine-aided teaching (Marty, 1981). In 2021, the concept of "metaverse" swept the world. The "metaverse" integrates augmented reality (AR), virtual reality (VR) and mixed reality (MR) to varying degrees to create mirror virtual worlds under the development of digital twin technology (Wang & Li, 2022). From Wang (2019) of virtual reality technology 3I features, namely imagination, immersion and interaction, virtual reality technology as one of the core concepts of "metaverse", can do the real context, enhance the "presence" (sense of presence) experience, for the development of the "education yuan universe" (Edu Metaverse) laid road. Second Life, launched in 2003, became the first phenomenal virtual world. Teachers can build teaching scenarios in Second Life and carry out task-based teaching in Second Life.

2.2 Virtual Reality Technology and Interpreting Teaching

On the basis of "Second Life", the European Union developed the IVY (Interpreting in Virtual Reality) virtual interpreting project for commercial and community interpreting fields in 2011, which is the first combination of virtual reality technology and interpreting, aiming to use virtual reality technology for interpreting training. Since then, the literature on the application of virtual reality technology in the field of interpreting teaching has emerged, but there is still a lack of systematic literature review research on the teaching of interpreting technology. Based on the past 11 years, this paper analyzes the following five questions and explores the development trend of virtual reality technology in interpreting teaching.

(1) What are the publication trends of relevant studies in the last 11 years?

(2) What are the research topics in the past 11 years?

(3) Who are the researchers in the last 11 years?

(4) What are the research areas of the related research focus on in the past 11 years?

(5) What are the research techniques and tools for relevant research in the past 11 years

3. Methodology

This paper mainly draws on the screening method of systematic literature review, and selects the journal catalogue and database keywords of major journals and databases at home and abroad. To ensure the academic influence of the literature, After searching the literature in the database, After reading, analyzing and screening the titles, keywords and abstracts, To selected five SSCI search source international journals, Including Interpreting, *The Interpreter and Translator Trainer* (ITT), *Journal of Computer Assisted Learning* (JCAL), *Interactive Learning Environment* (ILE), and *The Journal of Specialised Translation* (JST), 2 books, *Transactions on Computational Science XVIII LNCS 7*(TCS), and *New Prospects and Perspectives for Educating Language Mediators* (MPPELM), And a collection of conference papers, *Proceedings of the 2012 international conference on cyberworlds* (P2012IC), 5 Core journals from CSSCI searched for Chinese journals, Including *Technology Enhanced Foreign Language Education* (TEFLE), *Shanghai Journal of Translators* (SJT), *Chinese Translators Journal* (CTJ), *Foreign Language and Literature* (FLL) and *Foreign Language Education* (FLE). The international database is Web of Science, and Google scholar is supplemented, and the domestic database is CNKI. The documents selected by international journals and databases are English, while those selected by domestic journals and databases are Chinese. The key words are “virtual reality” and similar words (“virtual reality”, “virtual environment” and “virtual world”). Key keywords related to interpreting teaching are “interpreting teaching”, “consecutive interpreting”, “simultaneous interpreting” and “visual interpreting”, etc. After manual screening of literature titles, abstracts, keywords and conclusions, the full text was read for content analysis, and 19 effective studies were finally selected (10 in English and 9 in Chinese). Based on five research topics, the coding system and analysis framework of the systematic review of VR literature applied to language teaching (Zheng et al., 2019). The coding data of the systematic literature review includes quantitative and qualitative data (Zheng et al., 2019). The quantitative data mainly used descriptive analysis and qualitative data for content analysis.

4. Result

4.1 The Overall Trend of Publications in the Past 11 Years

In the past 11 years, a total of 19 studies in the application of virtual reality technology in interpreting teaching. As shown in Figure 1, the year with the most publications was 2021 (4 publications), and the number of publications in 2015 was zero. It is worth noting that since 2017, for the first time in China, the number of articles is one. As shown in Figure 2, audio-visual Teaching (4) contains the most articles in China, and The Interpreter and Translator Trainer (ITT) contains the most articles in international journals. There are no books containing relevant literature in China. It can be seen that relevant studies at home and abroad are still in the exploratory stage and have not attracted wide attention.

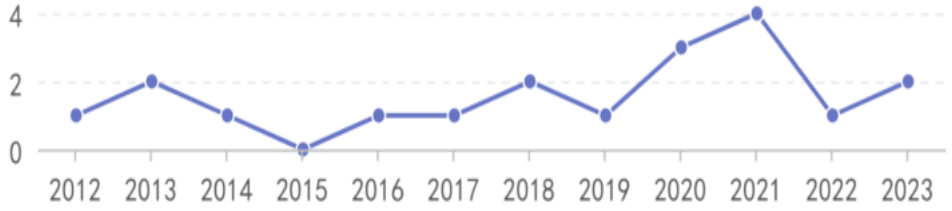

Figure 1. Volume of Articles Issued in Each Year from 2012 to 2023

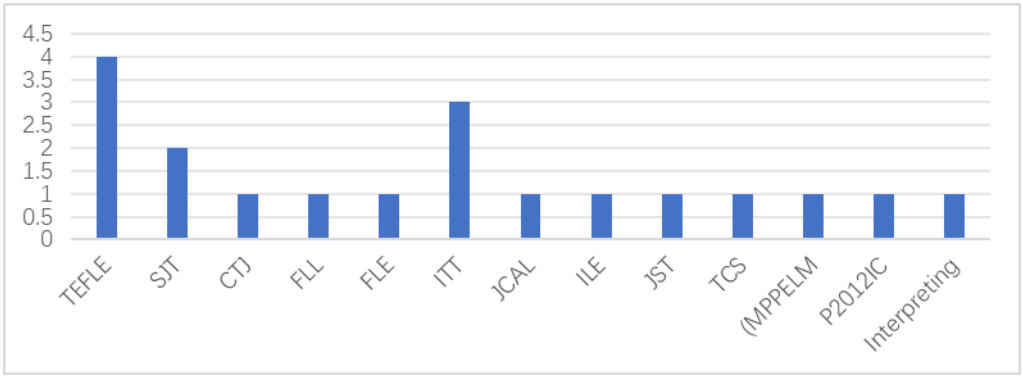

Figure 2. Total Content of Journals and Books from 2012 to 2023

4.2 Research Topics

4.2.1 Study Methods

According to the classification framework of sociological research methods of Feng (2021), this research is based on three types of research methods of 19 studies, as shown in Table 1, including empirical studies (13 articles), theoretical studies (3 articles) and literature review (4 articles). Therefore, the current teaching of virtual reality interpreting takes empirical research as the main way and trend.

Among the 13 empirical studies, the number of experimental studies was the largest (10 studies). Pchhacker (2005) defines the interpreting activity as a situational communicative behavior in a specific social activity, and emphasizes that its process involves a variety of cognitive activities. In the experimental research, teachers combine virtual reality technology with traditional teaching. For example, Zhang and Zhou (2021) take the trinity of context, discourse and context as the construction principle, use virtual reality technology to establish realistic scenes, create virtual reality platform, and provide students with immersive oral training scenes. In the past 11 years, with the development of virtual reality technology, different experimental platforms for virtual reality application in interpreting teaching have emerged at home and abroad, which further promoted the increase of the number of experimental studies. In terms of data collection in these 13 studies, there is a trend of diversification, including questionnaire survey, content interview, corpus analysis, test, observation, comparison group experiment and focus group; data analysis includes T test, symbolic anecdote test and so on. Chao

(2021) used T-test to analyze the experimental data and concluded that the immersive scenario simulation with 3D virtual reality technology and role-play preparation could help reduce the cognitive load in the process of consecutive interpreting and improve the interpreting performance of translators. Chan (2023) analyzed the experimental data using a mixed analysis method of Wilcoxon symbol anecdote test and paired sample T test, and concluded that the use of VIP significantly improved students' self-rated language and interpreting ability, as well as their interpreting performance in the two modes and language directions. In general, the empirical research conclude that the application of virtual reality technology in interpreting teaching has positive significance and plays a positive role in improving the teaching effect of interpreting.

Table 1. Statistics of the Proportion of the 19 Studies

Research method	research technique	Number of studies (part)	proportion
Empirical study	Corpus analysis	1	5.26%
	experimental research	10	52.63%
	content analysis	1	5.26%
	Mixed research	1	5.26%
Theoretical research	Situational care	1	5.26%
	Cognitive mechanism	1	5.26%
Literature review		4	21.05%

4.2.2 Research Topics

Through content analysis, the study summarized 7 research topics (Table 2), among which the influence of virtual reality attracted the most attention (11), including 5 domestic ones, starting from 2018, and 6 foreign studies since 2012. Domestic studies on this topic were significantly later than those conducted abroad. The 11 studies included: Jiang and Peng (2018); Liu (2016; 2018); Zhang and Zhou (2021); Zhai (2019); Şahin (2013); Ritsos et al. (2012; 2013); Braun and Slater (2014); Braun et al. (2020); Gerber et al. (2021); Chao (2021).thus it can be seen Braun has an early and rich research on the change of teaching mode brought about by the application of virtual reality technology in interpreting teaching, which is greatly related to her long-term participation in the construction of IVY project.

Other research topics include: discussion on the influence of virtual reality on interpreting cognitive mechanism, Chao (2021, p. 93) concluded through experimental research: using 3D virtual reality technology for immersive scenario simulation and role play preparation can help reduce the cognitive load and improve interpreting performance of interpreter; Guo et al. (2021, p. 73) focused on the cognitive process of virtual reality interpreting training, discussed the role of language perception dual

processing mechanism between virtual and reality; the feasibility and challenge of virtual reality technology applied in interpreting teaching, Eser et al. (2020, p. 288) noted that the use of wearable devices in interpreting training has the potential to create immersive virtual environments for self-directed learning and improve interpreting training with teaching support. However, challenges such as physiological effects, authenticity level and the need for equipment support need to be further explored and improved in their teaching applications in the future; Braun et al. (2020) studied whether the two virtual learning environments (VLE) can support the development of interpreting skills and improve the specific challenges of remote interpreting; studied the teaching effect, Hu and Xia (2023, p. 86) conducted a one-semester exploratory teaching experiment based on the virtual simulation interpreting training platform, and the VR assisted interpreting teaching mode is effective and feasible, recognizing the teaching mode. In addition, there are the development of virtual reality applications in interpreting materials (such as Zhao, 2017), student feedback of virtual reality technology in interpreting teaching (such as Chan, 2022), and the impact of virtual reality on interpreting capabilities (Chan, 2023).

Table 2. Research Topic Classification for the 19 Studies

order number	class	Number of studies (part)	proportion
1	model of instruction	11	57.89%
2	Cognitive mechanism	2	10.53%
3	Textbook development	1	5.25%
4	teaching efficiency	1	5.26%
5	Feasibility and challenge	2	10.53%
6	Student feedback	1	5.26%
7	Interpretive ability	1	5.26%

4.3 Researchers and the Research Levels

Most of the researchers in the 19 articles were teachers (16), and only one was students. The lack of interpreters who are directly involved in interpreting among researchers, which leads to the lack of the most direct combination of interpreting and virtual reality technology. The research level was mainly focused on the translation major of higher education (16), while a small number of studies focused on continuing education (3). The domestic discussion on the relationship between virtual reality technology and continuing education began in 2018 (Jiang & Peng, 2018), significantly later than the foreign study date (Ritsos et al., 2012). The discussion on the integration of continuing education and virtual reality technology at home and abroad is still in its initial stage, and further research is needed, which also shows that the integration of virtual reality technology and interpreting occurs more in

universities than in the continuing education directly related to the interpreting market. However, "continuing education in translation is a continuation of college education. With the increasing demand of domestic interpreting service market, it is urgent to establish a high-end translation training system, so that translation practitioners can accumulate experience and continue to learn in their work" (Jiang & Peng, 2018). Therefore, the use of virtual reality technology has great practical significance for the translation continuing education, and the translation industry needs to continue to explore the integration and innovation of the two. Combined with Table 3 and Table 4, the current application of virtual reality technology in the field of interpreting is still largely limited to the universities. In the future, we still need to continue to explore and expand the application of virtual reality technology in the field of interpreting, so as to further promote the combination of interpreting field and modern information technology.

4.4 Research Areas

4.4.1 Target Language

Among the 19 studies, the target language showed the following characteristics: the number of studies totaled 11, among which the scholar from City University of Hong Kong, published Venus Chan in 2022 and 2023, and the remaining 9 were Chinese scholars; the target studies in multiple languages, 5 of which the authors include the host of IVY project and professor of translation from the University of Surrey S. Braun (e.g., Ritsos et al., 2012; 2013; Braun et al., 2020; Braun et al., 2013; Gerber et al., 2021; Braun & Slater, 2014).There are two articles in the other languages. Since 2013, there has been more integration of English-Chinese translation and virtual reality technology than other languages, which has a positive effect on the application of Chinese virtual reality technology in English-Chinese translation.

4.4.2 Interpreting Scenario

interpreting scene can be divided into a variety of, including community interpreting refers to, "occurs in the community, interpreter, schools, courts, police, tourist attractions, companies, production or construction sites, government services, media organizations, training or competition venues, interpreter at the scene or through remote technology, mainly by consecutive interpreting (sometimes whisper) of interpreting" (Ren, 2010, p. 10). The interpreting of different scenes has its own characteristics, and the scenes need to be distinguished when studying them "Professor Ren Wen's definition takes into account the characteristics of China as a non-immigrant country: compared with western immigrant countries, community interpreting (or contact interpreting) is not based on public service agencies, and the proportion of business interpreting and other activities may be higher than that in the West" (Jiang, 2021, p. 7). However, of the 19 studies, 11 studies from Chinese scholars did not distinguish between interpreting scenarios.8 Six of the foreign studies focused on community interpreting, including four on business interpreting, including Ritsos et al. (2012; 2013); Braun et al. (2013); Braun and Slater (2014).

4.5 Design and Development of Virtual Reality Platform

According to the statistical classification of virtual platforms involved in 19 studies, the specific platforms of virtual reality technology in the field of interpreting can be divided into two categories: first, IVY virtual reality platform based on the Second Life; second, independently design virtual reality platform. The IVY virtual reality platform based on Second Life is still the S. Professor Braun and other scholars study the application of virtual reality technology in interpreting teaching platform. In 2003, Second Life (SL) is a multi-user 3D virtual environment, Being situational, interactive, immersive, creative, and diverse, based on this, In 2011-2013, The European Union funded six universities in the United Kingdom, Poland, Cyprus, Germany, Israel and other countries and the German Steinbeis Language Learning Media Company (STW) to carry out an exploration study based on SL virtual reality environment interpreting training, Name is IVY (Interpreting in Virtual Reality, 2013). In recent years, with the development of virtual reality technology, virtual reality platforms independently designed with interpreting teaching have gradually emerged. Among them, there are 6 studies based on independently designed virtual reality platforms in China, and 4 other studies based on independently designed virtual reality platforms in China. Both the IVY project virtual platform and the self-designed virtual reality platform, there are several interpreting training scenarios for learners to explore and learn interpreting skills in different scenarios and immersive experience of interpreting activities in different scenarios. Moreover, the virtual simulation platform is mainly based on the computer desktop virtual simulation environment and VR glasses virtual reality environment. For example, the two virtual reality platforms mentioned in the research of Hu and Xia (2023) include these two virtual reality environments. Virtual display platforms generally have AI intelligent scoring function.

Table 3. Virtual Reality Platforms in the 19 Studies

order number	Virtual reality platform	The number of research	
1	“Second Life”	The IVY virtual reality platform based on the Second Life	7
		Introduction to the IVY project virtual reality platform	2
2	Design the virtual reality platform independently	internal	6
		external	4

5. Discussion

Reviewing the research of virtual reality technology in interpreting teaching, we can find that the research in China started late, but the development momentum is good. According to the statistical results of the systematic literature review, there are few relevant studies at home and abroad, and there are more empirical studies in recent years. The author believes that this reflects some difficulties and deficiencies in the application of virtual reality technology in the research of interpreting teaching, namely:

1) In the past 11 years, there were 19 studies of virtual reality technology in interpreting teaching. Relevant studies at home and abroad are still in the exploratory stage and have not yet attracted wide attention. Based on literature statistics, the application of virtual reality technology in interpreting teaching by foreign scholars began in 2012, with Braun and other researchers reported the results of the IVY project. In contrast, the research in China started late, the review literature accounted for a relatively large proportion, the theoretical research accounted for a relatively small proportion, and the theoretical research is still in the exploratory stage. Most foreign scholars focus on empirical research, and have little exploration of theoretical research. There are few research topics, mostly focusing on the influence of virtual reality technology on the teaching mode, and there is a lack of interpreters directly involved in interpreting activities among researchers, and a lack of the organic combination of practice and theory. The research level mainly focuses on translation majors in higher education, and a small amount of research focuses on continuing education.

2) Most of the virtual reality platforms involved in the study were designed for interpreting students and interpreters. Only the virtual reality platforms in the two studies considered the customer service for interpreting services (including Ritsos et al., 2013; Braun et al., 2014). Interpreting is a multi-party interaction, and training the participants through the virtual reality platform can improve the interpreting effect, but there are very few studies on this aspect.

3) In terms of interpreting mode and target language, relevant studies at home and abroad show great differences. Generally speaking, most domestic scholars tend to make studies that do not distinguish between the mode (8 articles), and the target language is limited to Both English and Chinese. Among them, Zhai (2019) and Chao (2021) specifically studied the integration of consecutive interpreting and virtual reality technology, and Chan (2022, 2023) studied the combination of consecutive interpreting and visual translation and virtual reality technology. The interpreting mode that scholars from the last of the world generally care about include dialogue interpreting, contact interpreting and consecutive interpreting.

4) Studies do not distinguish the interpreting scenarios as detailed enough. According to statistics, 11 studies from Chinese scholars did not distinguish between interpreting scenarios; 6 of the 8 studies from the last of the world focused on community interpreting, including 4 on business interpreting, including Ritsos et al. (2012, 2013); Braun et al. (2013); Braun and Slater (2014).

In view of the above possible problems, the author intends to propose the following four aspects that

can be explored in interpreting teaching.

Theoretical application of augmented virtual reality in interpreting teaching. Under the existing theoretical basis, we should continue to broaden the theoretical research perspective and promote the diversification of research methods. In the study of interpreting theory, modern information technology, such as AI technology, is fully utilized to develop interpreting theory under the metacosmic perspective. In addition, the scope of research topics should be continuously expanded to encourage front-line practitioners in the interpreting industry to strengthen theoretical study and research, and to promote the organic combination of interpreting theory and practice.

Promote the diversification of the service objects of the virtual reality platform. As a multi-party interactive activity, interpreting requires all parties to make necessary preparations and exercises before the activity. In this respect, the virtual reality platform can just help all parties in the interpreting activities to have immersive experience and practice, so as to promote the smooth progress of interpreting activities.

Strengthen the multiple concerns in the interpreting mode and objectives and aspects of related research. The detailed interpreting mode and the exploration of multi-language platform can show and utilize the role of virtual reality platform to the greatest extent, and provide more personalized services for platform users, so as to meet the needs of different users.

Further distinguish between interpreting scenarios. In both platform design and theoretical research, personalized, interesting and operable interpreting scenes are needed, which is an important sign that virtual reality technology achieves 3I characteristics, and also the fundamental difference between the interpreting training mode of virtual reality technology and other training modes.

6. Conclusion

This study for nearly 11 years of virtual reality technology applied in interpreting teaching 19 research analysis, from the published trend, research problems, researchers and level, research and the design and development of virtual reality platform in five aspects, formed the virtual reality technology applied in interpreting teaching systematic literature review analysis framework and coding. Through the analysis method of quantitative analysis and qualitative analysis of tuberculosis, the analysis of the above five mentioned research problems is conducive to the subsequent research on the application of new technologies in interpreting teaching. The interpreting process involves a variety of cognitive activities, which is a kind of situational communicative behavior in specific social activities (Pchhacker, 2005; p. 684). Situation factors play an important role in interpreting, so the interpreting teaching must be placed in a real situation to achieve the maximum effect (Kurz, 2002, p. 65). The characteristics of virtual reality can just help users achieve the effect of immersive scene, which requires the efforts of interpreting practitioners, teachers, scholars, technical developers and other parties to provide a platform and method for the development of interpreting teaching.

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