

A Systematic Literature Review of Virtual Reality in Adult Foreign Language Education

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Abstract: Virtual reality in language education has been an increasingly important research topic in recent years. This study conducted a systemic review of virtual reality in adult foreign language education with 12 empirical articles selected from four SSCI journals, *Computer Assisted Language Learning (CALL)*, *Computers & Education*, *Language Learning and Technology (LLT)* and *ReCALL* from 2013 to 2017. A systematic content analysis method was employed to analyze the basic information, research topics, research methods, participants, research contexts, and research findings. This research will provide some pedagogical implications for language educators, scholars and learners.

Keywords: virtual reality, virtual environments, literature review, adult foreign language education

1. Introduction

The rapid advancement of emerging technologies presents learners, educators and scholars around the globe with unprecedented opportunities to improve teaching and learning. Foreign language or second language education in virtual worlds or virtual environments has been subject to a continuous research interest since their emergence (Wang, 2015). Plenty of research supported the use of virtual reality (VR) in foreign or second language education because of its potential of providing language learners with the needed language contexts, immersive and free learning environments without any spacial or temporal barrier as well as the potential of enhancing language learners' language performance and language acquisition (Lan, 2014; Lan, 2015; Lan, Kan, Hsiao, Yang, & Chang, 2013; Me, 2016; Peterson, 2011; Ryu, 2013). A variety of three-dimensional virtual environments (3DVEs) have been used in foreign language education, such as Second Life, World of Warcraft, Active Worlds, SimCity, and Quest Atlantis (Chen, 2016; Peterson, 2016; Sadler, 2012). These 3DVEs may hold pedagogical implications for education, evidenced by the fact that educators and institutions have increasingly embraced 3D virtual learning.

This research conducted a systematic literature review of publications concerning the application of virtual reality in adult foreign language education from 2013 to 2017. A total of 12 articles were selected from four SSCI journals, *Computer Assisted Language Learning (CALL)*, *Computers & Education*, *Language Learning and Technology (LLT)* and *ReCALL*. A systematic content analysis method was employed to analyze. NVivo 11.0 was used to code and analyze the basic information, research topics, research methods, participants, research contexts and research findings. After analyzing, this literature review tried to answer the following questions:

- (1) What are the general research trends of virtual reality in adult foreign language education?
- (2) What are the main research topics of virtual reality in adult foreign language education?
- (3) What kinds of research methods were used in the research of virtual reality in adult foreign language education?
- (4) What are the pedagogical implications of virtual reality for adult foreign language education?

2. Method

2.1 Articles Selection

Four refereed Social Science Citation Index (SSCI) journals, *Computer Assisted Language Learning (CALL)*, *Computers & Education*, *Language Learning and Technology (LLT)* and *ReCALL*, were selected in the research. These journals rank Top 60 in SSCI-indexed journals in the field of educational technology and language learning with rich representation of international contributing authors. The period of time of the selected articles spans 5 years, from 2013 to 2017. First, the empirical articles in the four journals from 2013 to 2017 were downloaded from Web of Science. Then, NVivo 11.0 was used to select articles related to the research. The terms “virtual reality”, “virtual worlds”, “virtual environments”, “virtual community”, “Second Life” and “language learning” were employed to article filtering. As a result, 27 articles were identified. Then, after further reading, 15 articles unrelated to virtual reality and adult foreign language learning were removed. At last, a total of 12 journal articles were selected.

2.2 Coding Scheme

NVivo 11.0 was used to code and analyze the articles. The coding scheme were adapted from the systemic reviewing approach advocated by scholars in previous research (e.g., Lee, Wu, & Tsai, 2009; Tsai & Wen, 2005). For this review, six main aspects as follow were analyzed:

- Basic information: first author, year of publication, and journals names
- Research topics
- Research methods and data collection
- Participants and research contexts
- Research findings

3. Results and Discussion

3.1 Basic Information

After coding and analyzing of the 12 articles with a content analysis method, the basic information included year of publication, name of journals and first author’s country were analyzed and concluded. Figure 1 shows the number of articles published from 2013 to 2017. The solid lines represent the numbers of published articles from each of the four individual journals each year, and the dashed line indicates the total numbers of published articles across four journals each year. The research trends were revealed in Figure 1. Overall, the total numbers of VR articles in language education published each year showed a rising trend from 2013 to 2016. Especially in 2015 and 2016, there are 10 articles published, which accounted for 83% of the publication from 2013 to 2017, but after 2016 articles of VR in language education plunged and there was even no publication in 2017.

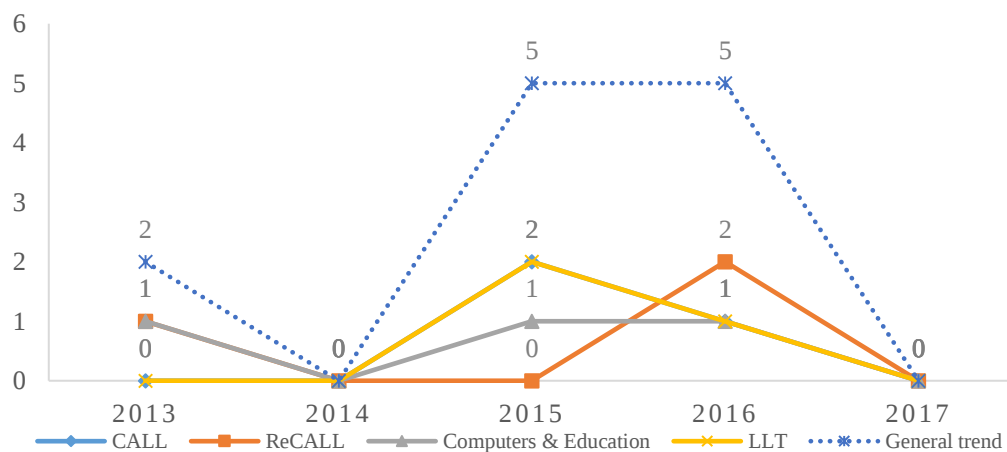


Figure 1. Numbers of Articles Published by Journal Yearly from 2013 to 2017

Figure 2 shows the results of individual journal publications by country based on the first author's affiliation. Taiwan is the most productive from 2013 to 2017, next is the France and Australia. It may mean Taiwan paid great attention to the development of VR in language education and did many empirical research.

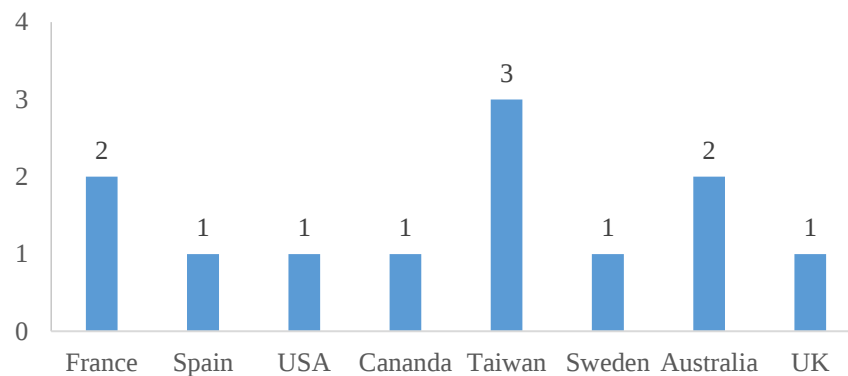


Figure 2. Country Productivity of Articles by Journal from 2013 to 2017

3.2 Research Topics

Figure 3 shows the research topics of VR in adult foreign language education publication. It can be mainly divided into six parts. Many of the research subjects are students. Only 2 of the 12 articles from 2013 to 2017 studied language teacher's roles (Wang, 2015) and teacher training (Kozlova, & Priven, 2015) based on VR. The research which studied students mainly focus on learners' linguistic skills and learners' individual difference, and some are focus on learners' non-linguistics skills and overall language acquisition (Berns, Gonzalez-Pardo, & Camacho, 2013; Tang, Sung, & Chang, 2016). Some research studied about the task-based language learning (Chen, 2016; Lan, Kan, Sung, & Chung, 2016) in virtual environment or virtual world. The research about learners' linguistics skills mainly studies the effects of virtual reality on learners' reading engagement (Park & Kim, 2015), reading performance (Park & Kim, 2015), listening comprehension (Levak & Son, 2016) and oral interaction (Lan et al., 2016; Melchor-Couto, 2016). Those about learners' non-linguistics skills mainly studied about learners' culture learning (Shih, 2015) and learners' communication (Tang et al, 2016; Wigham & Chanier, 2013; Wigham & Chanier, 2015). Those researched about learners' individual difference mainly can be divided into the effects of VR on learners' motivation (Berns et al., 2013; Lan et al., 2016), perception (Chen, 2016) and anxiety (Melchor-Couto, 2016). And one of the articles also studied about learners' affordances and acceptance (Levak & Son, 2016) of virtual reality.

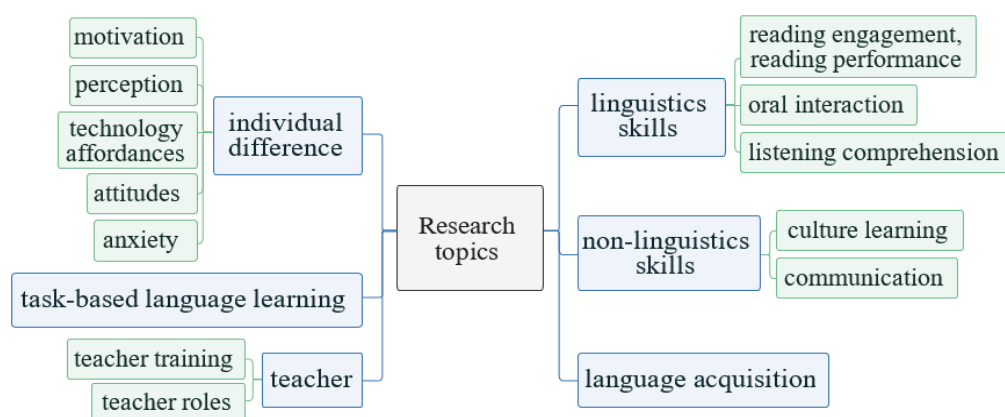


Figure 3. Research Topics

3.3 Research Methods

Table 1 shows the research methods and data collection of the research of VR in adult foreign language education from 2013 to 2017. Most of the research used a mixed-methods approach which accounted for 50%, while four of twelve used qualitative research methods and only two articles used quantitative research methods. Most research tended to combine quantitative data and qualitative data together to do research. For the research design, many research used quasi-experiment design in quantitative research and mixed-methods research. Some of the articles did not mention its research design. As for data collection, in quantitative research and mixed-methods research, questionnaires and tests are most frequent used. In a mixed-methods research, questionnaires or tests, always combine with interview to do research.

Table 1

Research Methods and Data Collection of the Research from 2013 to 2017

Research methods	Research design	Data collection	References
Quantitative research	Case study	Questionnaires, tests	Berns et al., 2013
	Quasi-experiment	Tests, questionnaire	Lan et al., 2016
Qualitative research		Wikis, journal entries, screencasts, instructor's notes	Kozlova & Priven, 2015
	Action research	Observation, recordings of conversation, screencasts	Tang et al, 2016
		Recordings of the course, interview	Wang, 2015
		Screen and audio output, text chat logs	Wigham & Chanier, 2015
		Online questionnaires, observation, journals, interview	Chen, 2016
A mixed-methods approach		Tests, interview	Levak & Son, 2016
	Quasi-experiment	Questionnaires, open-ended questions	Melchor-Couto, 2016
	Quasi-experiment	Questionnaires, tests, open-ended questionnaire	Park & Kim, 2015
	Case study	Observation, interviews, blog entries, tests	Shih, 2015
	Quasi-experiment	Observation, screen and audio output, questionnaire, interviews	Wigham & Chanier, 2013

3.4 Participants and Research Contexts

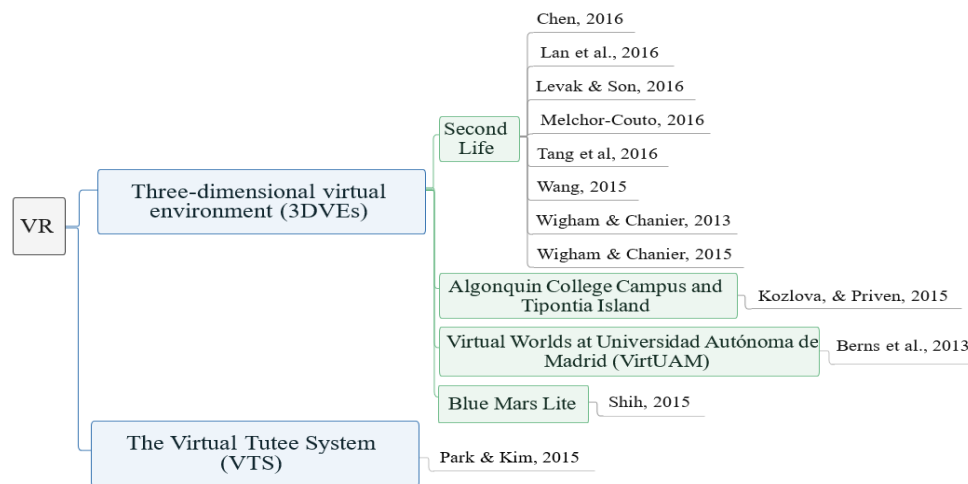
Table 2 reveals the participants in the research of VR in adult foreign language education. All the research conducted in higher education. And participants in most of the research is small sample size with less than 30 participants. Only one research studied more than 50 participants.

Table 2

Participants in the Research of VR in Adult Foreign Language Education

References	Number	Gender	Age	Research contexts
Chen, 2016	9	5F4M	21-55	
Berns et al., 2013	85			University
Kozlova, & Priven, 2015	5	4F1M	31-53	University
Lan et al., 2016	30		19-24	Universities
Levak & Son, 2016	35		18-30	Universities
Melchor-Couto, 2016	14		19-21	Universities
Park & Kim, 2015	18	16F2M	19.72	Universities
Shih, 2015	4	3F1M		University
Tang et al, 2016	11		18-60	
Wang, 2015	1 teacher 17 students		19-30	University
Wigham & Chanier, 2013	17	8F9M	21-25	University
Wigham & Chanier, 2015	17	8F9M	21-25	University

As for the research contexts, the main contexts used in the research of VR in adult foreign language education from 2013 to 2017 was 3DVEs. And in that the most frequent used was Second Life (Chen, 2016; Lan et al., 2016; Levak & Son, 2016; Melchor-Couto, 2016; Tang et al, 2016; Wang, 2015; Wigham & Chanier, 2013; Wigham & Chanier, 2015), while others used Algonquin College Campus and Tipontia Island (Kozlova, & Priven, 2015), Virtual Worlds at Universidad Autónoma de Madrid (VirtUAM, Berns et al., 2013), Bllue Mars Lite (Shih, 2015).

*Figure 4. Platforms Used in the Research of VR in Adult Foreign Language Education*

3.5 Research Findings

These research mainly did an empirical research to study VR's effects on adult foreign language learners' linguistics skills, non-linguistics skills, language acquisition or language performance and individual difference, and on teachers' training and teacher' roles. Virtual reality can provide language learners free, visual, immersive and linguistic support and facilitate language teaching and learning (Berns et al., 2013; Chen, 2016; Shih, 2015). The virtual environments or virtual worlds can make language learning easier and faster, and can significantly improve language learners' interest, enjoyment, engagement, attitude and motivation (Berns et al., 2013; Lan et al., 2016; Park & Kim, 2015; Shih, 2015; Wigham & Chanier, 2015). VR also can decrease language learners'

anxiety, but the anonymity should be paid attention to (Melchor-Couto, 2016). In these empirical studies, adult foreign language learners' linguistics skills (Berns et al., 2013; Lan et al., 2016; Levak & Son, 2016; Park & Kim, 2015;), non-linguistics skills (Shih, 2015), language acquisition and language performance (Shih, 2015; Tang et al, 2016) all significantly improved. And in virtual environments or virtual worlds, more collaborative and meaningful tasks as well as the design of activities based on the adaptive learning principles will improve adult foreign language learners' language learning (Chen, 2016; Berns et al., 2013; Lan et al., 2016; Levak & Son, 2016).

As for communication in virtual environments or virtual worlds, Tang and his colleagues (2016) researched about adult foreign language learners' communication competence, and its influencing factors. According to Wigham and Chanier (2013), language learners' the verbal and nonverbal modes of communication is dependent on the role that the student undertook during the activity and the particular instructions that the student in each role was given in virtual environments or virtual worlds.

Wang (2015) researched about adult foreign language teachers' roles in virtual environments or virtual worlds. The teacher was found to play four roles consistently in the three task phases: monitor role, motivator role, language guide role, and social role. In the research of Kozlova and Priven (2015), it is suggested that collaborative situated learning was an effective method of teacher training.

4. Conclusion

This research conducted a systemic review of virtual reality in adult foreign language education with 12 empirical articles selected from four SSCI journals from 2013 to 2017. Virtual reality in adult foreign language education still is a continuous research subject. And in empirical research, researchers tended to do mixed methods research which usually combined questionnaire, tests and interview together. The main research topics of VR in adult foreign language education were language learners' individual difference and language acquisition especially linguistic and non-linguistic skills. Virtual reality has the potential to provide language learners immersive and free learning environments which will improve language learners' language acquisition, learning interest and motivation. Virtual reality with more collaborative and meaningful tasks and more adaptive activities design were suggested in adult foreign language education. Due to the time limitation, this research only selected empirical articles from four SSCI articles from 2013 to 2017. Some research directions may not be revealed and analyzed clearly. Future research will analyze more articles systematically and thoroughly.

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