Scientific Research Publishing

Chinese Studies, 2023, 12, 269-278
https://www.scirp.org/journal/chnstd
ISSN Online: 2168-541X
ISSN Print: 2168-5428

AR Based CALL Design for English Language Learners in China

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How to cite this paper: Xin, X. (2023). AR Based CALL Design for English Language Learners in China. *Chinese Studies, 12,* 269-278.
https://doi.org/10.4236/chnstd.2023.124020

Received: September 15, 2023
Accepted: October 9, 2023
Published: October 12, 2023

Abstract

With the development of digitalization of education, augmented reality (AR) is largely developed and used in second language teaching. This essay aims to introduce an AR technique design within Computer Assisted Language Learning (CALL) for English language learners in China to learn English in virtual environment. First, an elaborate analysis about this artefact design will be given. Chapter two introduces the rationale, function, mode and the learner context of the AR based design. Then how to evaluate AR technique design is illustrated. Finally the significance of the study is given. The analysis of this paper demonstrates the effective AR usage in second language learning and provides inspiration to future research on this topic.

Keywords

Augmented Reality (AR), CALL, English Language Learner

1. Introduction

Augmented reality (AR) increasingly penetrates into our personal lives in various forms, including mobile games, professional skill training, tourism, TV dramas and so on. Due to the development of new technologies, computer-assisted language learning (CALL) has developed rapidly within the past decades. Yet, there have not been a wide range of reports exploring the topic of AR in language education, especially in teaching English.

The increasing maturity and popular application of AR and related technologies cater to the needs of social learning theory. The nearly real three-dimensional virtual environment created by AR can make it difficult for users to distinguish between real and fake virtual environments from a physical and psychological perspective. In recent years, AR has been fully integrated with network technology, allowing multiple users to immerse themselves in the same virtual envi-

ronment and interact in real time, thereby truly simulating the real world. "Second Life", a massively multiplayer online virtual world developed from the Linden Experiment in the United States in 2003, is an outstanding representative of this type of system. In the three-dimensional virtual language learning environment developed using AR, students are presented with a specific situation in which foreign language knowledge is generated. It provides an approximation of the real social and cultural environment of the target language. Students manipulate virtual avatars to immerse themselves in it, and what they see and hear are simulations of entities or events corresponding to knowledge.

This kind of environmental experience can attract students to actively participate in learning activities and naturally complete the meaning construction of the learned knowledge without the need for deliberate guidance. The three-dimensional virtual language learning environment can not only contextualize language learning, but also make the presentation of language knowledge three-dimensional and dynamic. A significant point that distinguishes this learning model from the previous CALL is that students can use language to directly participate, experience the social and cultural life of the target language, realize the interaction and cooperation between the individual and the social environment of the target language in the process of completing a series of social life tasks, and acquire practical and effective social practice abilities, which is exactly what foreign language learners are extremely lacking. It can be seen that the three-dimensional virtual language learning environment provides a good tool for language learning under the guidance of social learning theory. Its emergence is not accidental, but an inevitable product of the continuous development of theory and technology.

This essay aims to introduce an augmented reality (known as AR) technique designed within Computer Assisted Language Learning (CALL) for English language learners in China to learn vocabulary. The first part of this paper is the recent study in this field, AR based vocabulary learning in second language acquisition (SLA). Then an elaborate analysis about the rationale, function, mode and the learner context of the AR based design. Next, this artefact design will be evaluated mainly under the guidance of SLA criteria for CALL in Chapelle (2001). Six key factors are considered in chapter 4. In the end, this essay will point out the significance of the study and the direction of further AR study in SLA field.

2. Literature Review

The digital tools have changed the way we communicate, learn, educate, and interact with others which encourage researchers to explore the potential and limitations of technology. When it comes to English language acquisition, Salaberry (2000) said that technology has "the potential to create a paradigmatic shift in the teaching and learning of second languages" (p. 28). A significant approach to principled design of second language instruction is guided by task-based language teaching (TBLT). TBLT is a multifaceted approach which can fulfill dif-

ferent purposes. However, some researchers are against TBLT. Swan (2005) insisted that TBLT may work in advanced learners' language study but is less effective for beginners, especially when the interaction is among students in class instead of interacting with native speakers. Other researchers argued that tasks are intended to complement in the relationship of tasks and textbooks. A new approach task-enhanced learning (TEL) has been raised. The traditional teacher-centered class has changed due to the development of technology. Teachers nowadays are responsible to give the instruction and task. Students take more active role in class. The technology allows students to learn automatically and effectively.

In recent years, with the development of AR, this technique has been applied to many other fields such as marketing, medicine, architecture and construction (Rankohi & Waugh, 2013) and so on. AR also brings vitality into education (Yuen, Yaoyuneyong, & Johnson, 2011) which prompts traditional teaching strategy to reform. Carmigniani & Furht (2011) said that AR applying to education makes it feasible to "transform a classroom setting to a virtual learning environment: for example, real cultural artifacts triggering images or videos of their history, wall maps displaying geographical locations, portraits bringing to life real interviews" (p. 20). Two AR systems were designed by Hsu (2017) based on the way acquirer approaching the system, task-based linear and self-directed approach. Learning sequence did not be restricted when the educational AR system is based on self-directed approach. Ibrahim et al. (2018) designed *ARbis Pictus* based on task-based linear approach, which is immersive language learning within a novel system through dynamic labeling of real-world objects in augment reality.

According to Shenglan (2018), most AR application in education field examines multiple aspects of learning and the learning experience while some had only one focus. Six of the ten researches put an emphasis on vocabulary learning and three on the learner's learning experience with AR. Educators and researchers conducted empirical research on CALL (Zhang and Pérez-Paredes, 2019). Though AR applying in education has raised hot debate and some researches haven been done, a more empirical study with a more comprehensive view is deeply needed to explore the effective AR usage in language leaning.

3. The Introduction of AR Based Design

This chapter will give a detailed description of each elements of AR based design for language learners. First, it introduced us the rationale of the design and the importance of it. Then the function and mode will be explained. Last, it illustrated the learner context and how to make full use of the AR based application.

3.1. The Rationale of the AR Based Design

New technology for language learning seems very exciting, but it might become nothing more than recreation only if its design, use and evaluation are guided by

feasible educational and language acquisition rationales.

This artefact design is guided by SLA theory. There are five hypotheses about SLA according to Krashen (1981), they are 1) the acquisition-learning hypothesis; 2) the natural order hypothesis; 3) the monitor hypothesis; 4) the input hypothesis; 5) the affective filter hypothesis. Among them, acquisition has the central role in SL performance. Then a crucial question comes: how to acquire? The input hypothesis postulates that we are not focusing on the forms of input but try to understand the meaning of input. To achieve this in second language learning classroom, content is often provided through visual aids such as pictures and videos or discussion of familiar topics. The input hypothesis claims that the best way to teach speaking is to simply provide "comprehensive input." In other words, speaking ability is based on large vocabulary accumulation. What is more, the early speech ability is typically not grammatical accurate. As the acquirer hears and understand more input, other skills like listening, reading and writing will be improved. However, with the "comprehensive input", does the acquirer enhance the second language competence? The affective filter hypothesis answered this question. Krashen claimed that affective variables like personality and motivation also play an important role in SLA process. Burt and Dulay (1978) proposed an "affective filter" and it operated as below **Figure 1**.

According to the affective filter hypothesis, an acquirer in a not optimal affective state has a filter, or in other words, a mental block, which will prevent them from using the input to its full extent in further language acquisition process. If the students are not motivated, or distracted by other things, they may understand the input but will not get into the "language acquisition device". As shown in the chart, when the filter is up, input can not get access to language acquisition device and therefore, it will not strike "deeply" (Stevick, 1976).

To summarize, students acquire SL when they accumulate comprehensive input and at the same time, the affective filter is low enough to let the input in. To put it in another words, comprehensive input is the only causative variable that can affect second language acquisition. So large vocabulary input is a significant infrastructure for students to learn a second language.

3.2. The Function of the AR Based Design

This artefact is about an AR app which applies to class teaching and learning activity. It aims to design and implement a mobile-base AR application to help language learners learn vocabulary. And it also serves good purpose to develop students' interest towards English language learning.

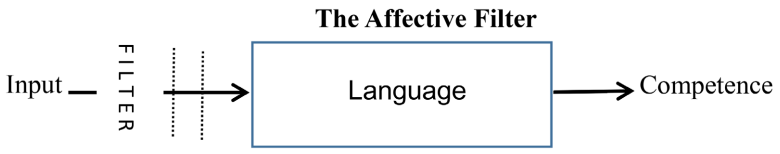

Figure 1. The affective filter.

Firstly, the AR technology provides a creative and interesting platform for language learners to learn vocabulary. The role of vocabulary in the second language learning has changed over time. Word learning concludes intentional learning (also known as explicit learning) and incidental learning (Nation, 2001). The latter one refers to learn vocabulary when the words are picked up while people's attention is focused on language use. Current teaching methods prefer meaning-based approaches which teachers are given the role to give the direct instruction to students. But the AR based app can contribute to change this traditional teacher-centered class into student-centered class. Students can use the app to scan the designed textbook to learn vocabulary. The animation will come out to explain the meaning and teach the pronunciation. Then in this second language class, teacher will give the instruction to guide students to finish the task and study automatically.

On the other hand, students are motivated by using this app. The aim of language learning is to achieve language competence, where competence is defined as "the expression, interpretation and negotiation of meaning" (Savignon, 2006: p. 673). AR based mobile application allows students to explore the world in English expression. They can use this app after class to scan an item in real world around them, for example, a pen, then they can learn the English pronunciation of "pen" and the animation and graphics can help them better understanding the meaning and strengthen their memory of this word. Language learners are sometimes curious about the expression of the same item in the target language and this app will be beneficial to accumulate large amount of "input" which will turn to the improvement of English proficiency. The communicative CALL claims that language should be taught using realistic settings and contexts. According to the input hypothesis and the affective filter hypothesis of SLA as discussed in last chapter, highly motivated students gaining comprehensive input can achieve dramatic achievement in SLA.

3.3. The Mode of the AR Based Design

AR is described with reference to two expressive modes to gather the information. The first one is visual metaphor which relies on a camera on the computer or mobile devices to recognize the "marker". Then the designed software will interpret the "marker" and deliver the information in response to physical reference points and its nature. This marker-based system has been developing to recognize the objects in real world as markers and flexibility has been increasing dramatically, even special gestures can be recognized. The second one relies on spatial positioning. The position-based applications use the GPS and compass information of the mobile devices or the image recognition technology to compare the target item picture with the image library to find a match. In this case accuracy is a critical factor. The popular game Pokémon GO is an example of location-based tracking.

Mobile devices such as smart phones and tablets play a significant role in AR since they are equipped with internet, apps and cameras. Therefore, it is possible

to obtain overlay virtual graphics and media over a physical object, such as a real object or a picture. The user will be exposed to the augmented virtual layers, such as 3D animations, videos or text dictionaries when they use the smart phone's camera to scan a picture or an object. Some technologies like head-mounted display (HMD), web cams, and digital projectors have also been applied to augment reality, but AR is not limited to particular type of display technology or sense of sight (Shenglan, 2018).

3.4. The Learner Context

The learner context of English Language Learners (ELLs) refers to the specific background, circumstances, and characteristics of individuals who are learning English as a second or additional language. Understanding the learner context is crucial for educators, as it helps tailor instruction and support to meet the diverse needs of ELLs.

The target group is Chinese students who acquire English as a second language. There are two reasons this report focuses on their computer assisted language learning. Firstly, in traditional classes, teachers take dominant position in class. They play an important role in class activity organization and curriculum design. Students acquire language skills in a passive way. Besides, The Education Bureau in China requires English grades to enter schools, so students in China take English classes as compulsory course. They need to study this language and get a good grade. Therefore, the common motivation for most English language learners is to pass the exam. And due to Chinese geographical location being far away from English native speaker's country, students have limited chance to "sink" in English environment. Therefore, AR based application can help them emerge in language environment and improve their independent study ability.

Secondly, English is classified as Indo-European language while Mandarin is known as Sino-Tibetan language. These two languages belong to different language family which also contributes to the difficulty of learning English for Chinese students. According to Piaget's (Simatwa, 2010) cognitive theory, intuitive knowledge like pictures, games and animation are easier accepted for them. The AR based application can decrease the difficulty for them in second language acquisition.

To conclude, the application of technology in second language acquisition is significant. Both teachers and students need to be trained on how to operate the tablet and employ designed applications properly to get the best usage of technology.

4. Evaluation of the AR Based Design

Wide variety of platforms, apps can not be evaluated in the same way. According to the goals and the purposes, they are evaluated with different methods. Typically three approaches are used to evaluate software for CALL, checklists, methodological frameworks and SLA based approach.

The evaluation of this AR based design is based on Chapelle's (2001) SLA cri-

terion for CALL. There are two types, empirical analysis and judgemental analysis. This artefact is analyzed with judgemental analysis. 1) Language learning potential: the learning task is to study vocabulary and enhance the input of the target language, so it focuses on the structure and meaning of the input instead of forms; 2) Learner fit: Language learners are motivated to learn this language by AR technology which provides quantities resources like animation, sound and pictures. Students take more active role in class and learn to study language automatically; 3) Meaning focus: The artefact helps the teaching activities become task-enhanced language learning. Instructions and tasks are given to students by teachers to help them learn with assistance of AR application properly and effectively; 4) Authenticity: The vocabulary they learn through AR are from designed textbook as well as the item in real world. Knowing the English expression of the item around students is beneficial for them to develop interest which leads them to explore further; 5) Positive impact: Most English language learners are taught by non-native speakers. They are less advantageous than those who want to learn English living in native English language country. The artefact can make up for that. It can provide rich and authentic language environment; 6) Practicality: Apps can be downloaded on the mobile devices and can be used at anytime in anywhere. Therefore, there is no limitation of learning language in a specific lab or at a particular time. Students can learn language whenever and wherever possible.

Interaction is also considered very important in SLA. Language acquisition is assisted by social interaction of learners and their interlocutors. Especially when they negotiate towards mutual comprehension of the meaning of the word. The designed AR based app provides platform for students to share the vocabulary they have learned. After they scanned an item, this word will be recorded automatically into the word list by the app. If students find this word interesting, they can choose "click and share", other students can access to this word, too. This function raises the possibility for students to use this English word in later communication. This will enhance the interaction and memory. Besides, assessment and feedback are also essential parts in SLA. The vocabularies that students have checked have been recorded and will form a vocabulary exercise to help them review the words they have learned. The assessment system will generate feedback individually and list those words students have chosen the wrong meaning in the exercise in another word list and these words will occur frequently in later exercise.

5. The Significance of the Study

Despite all the advantages and convenience AR technology has brought to SLA, there are a few noticeable things to pay attention to. It is a common belief that old generation teachers fear of using technology in the classroom activity. The AR based application should be introduced to teachers through detailed training or visiting schools. Teachers should be encouraged to use technology in language

learning class.

With the ongoing research and widespread application of AR based language learning environments, CALL (Computer Assisted Language Learning) has taken on new significance and functionality. Three-dimensional virtual language learning environments offer immersive, multi-dimensional, and dynamic cognitive tools for language acquisition. The core idea of constructivism is "student-centered", emphasizing that students construct the meaning of knowledge through interactions with others or external environments. The growth of CALL based on online multimedia has been robust in recent years, partly due to the ongoing transition in traditional educational philosophies, and partly because of technological limitations. Three-dimensional virtual language learning environments present new opportunities for language learning, allowing students to immerse themselves and experience future real-life scenarios of knowledge application through individual and social interactions. Simultaneously, they obtain real-time, intuitive, and natural perceptions and cognitions through sight and sound, facilitating knowledge internalization, problem-solving, and returning to the essence of language acquisition. The AR based language learning environment holds unique value in contextualizing learning media. It offers critical insights into improving the traditional methods of presenting computer network teaching content, which has primarily relied on two-dimensional texts and audio/visual materials. It assists in enhancing students' abilities to understand language, analyze problems, and explore and apply new knowledge, thereby becoming an effective cognitive tool for language learning in the digital age.

6. Conclusion

There is no denying that AR with various media tools will be a much indispensable part of our life in the future, especially in the education fields. "Technology has caught up with the idea of augmented reality as devices have become cheaper, smaller, and sufficiently powerful to run applications" (Salmon & Nyhan, 2013). The AR based application in mobile devices not only brings vitality to education and improve ESL class effectiveness, but also stimulate language learners to automatically learn English. The application of AR technology in language classroom can provide richer learning environment which is one of the essentials of SLA. Besides, it will make learning more effective, interesting, productive, and faster.

Although the contribution of AR technology to education has been examined in different studies, the research on this topic is still at the beginning level. As an entailment for further studies, experimental researches which are rare in conducting about the effectiveness of AR applications on various age groups and more AR software can be designed and developed in accordance with innovations in this field. Besides, there is no such study on learning Mandarin Chinese as second language. Due to the complexity of Chinese character, the technology assisted language learning will be of great help.

Fundings

Supported by the Translation of English Culture Virtual Teaching and Research Section (Grant No. 2022XJXNJYS02); Supported by Teaching Reform Research of Department of Education of Liaoning Province (Grant No. 2022SJJGYB04).

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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