Chapter 11
Mixed Reality Environments in Teaching and Learning English

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ABSTRACT

The purpose of this chapter is to familiarize readers with various forms of mixed reality environments that are used in different countries in the field of education including teaching and learning English. MiRTLE, The MARVEL Project, TIWE Linguistico, SMALLab, Virtual Touch Toolkit, SimSchool®, Second Life, and TLE TeachLivE™ are some of these technological advances that will be discussed in detail. Further explanation about the current and future use of TLE TeachLivE™ as well as other possible forms of mixed reality environments is also provided. The chapter concludes with current limitations of mixed reality environments and potential future research and applications.

INTRODUCTION

Globalization in the 21st century has been the subject of debates in numerous fields of study including but not limited to politics, economics, sociology, linguistics, and education. Various definitions and explanations have been provided to unravel the meaning, effects, and consequences of moving towards a globalized world. Blommaert (2010) defines globalization as "shorthand for the intensified flows of capital, goods, people, images and discourses around the globe, driven by technological innovations mainly in the field of media and information and communication technology, and resulting in new patterns of global activity, community organization and culture" (p. 13).

The invention of new technologies such as computers and Internet has also been a major contributing factor to the phenomenon of globalization. Invented in the 1970s mainly as a governmental instrument for the purpose of controlled communication; the internet soon developed into a tool for researchers and scientists to share data among a limited number of computers. Consequently, the creation of the World Wide Web led to precisely what it was intended to do: to capture a wide audience from around the globe in its web. The 1990s brought in the commercialization of the Internet with people from around the world sharing their ideas, businesses, and interests with others. Subsequently, the 2000s witnessed

the formation of social networks, thus adding a significant layer to the interconnectedness of the global users from a wide range of ages and backgrounds (Ulmer, 2003).

One of the main influences of globalization and the rapid development of technology with its ever-growing applications has been in the areas of communication and language use. Even though users of such technologies can easily communicate with their peers who share their first language across various domains of the World Wide Web, in order to interact with those who do not share the same first language they needed to be able to utilize a common language. English as the Lingua Franca of the current era has created a common ground for Internet users to connect and share a plethora of information. Therefore, learning and teaching English has become a major area of focus in the pursuit of a globalized world (Mirsky, 1991; Doris, 2007).

The unprecedented integration of virtual communities has also been accompanied by a physical one. The 21st century has brought forward several routes for people around the world to travel to other countries and make real-life connections with other communities either temporarily or permanently. Immigration has become the hallmark of modern societies, which in turn opens the door to a number of other factors that contribute to and affect this global phenomenon.

IMMIGRATION AND LANGUAGE

Even though immigration in its many forms has played a key role throughout human history, the Great Depression of the 1930s and the aftermath of the World Wars brought forth new waves of immigrants toward different countries around the globe (Pedraza, 1995; Chiesa, Scott, & Hinton, 2002). The 1960s also saw a great shift in large-scale immigration as the global market started flourishing, transportation became easier, and new technologies facilitated the interconnectedness of the world (Reimers & Troper, 1992; Meyers, 2004).

According to the data from the *International Migration Report of the United Nations* (2016), the number of immigrants worldwide has increased from 173 million in 2000, to 222 million in 2010, and 244 million in 2015 respectively. Additionally, this rapid growth of international immigrants may be doubled by 2050 (Süssmuth, 2007). It is predicted that by the year 2040 in the United States alone, immigrant children will make up at least one-third of the overall student population in schools (Meyers, 2004; Suarez-Orozco, Suarez-Orozco & Todorova, 2010). The majority of the newcomers do not speak the main language of the new country, thus making their integration in the dominant society more challenging. In the case of English speaking countries with large-scale immigration annually such as the United States, policy makers and teachers seek different ways to make learning and teaching the target language easier for the learners.

LANGUAGE LEARNING AND TEACHING

Many theories have been formed throughout the years to explain the process of second language learning. One of the most prominent of such theories has been the Sociocultural Theory or SCT. Pioneered by Vygotsky (1978) SCT claims that language learning is the result of both cognitive processes and social interactions with more emphasis being placed on the latter. In other words, according to SCT learners of a language make progress in their learning via social interactions they have with others such as their

teachers or peers. Zone of Proximal Development and Scaffolding are also two closely related topics within SCT. Zone of Proximal Development or ZPD is defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). Hence, the ZPD suggests that outcome of learning from more knowledgeable others is notably different from learning independently. Similarly, scaffolding is used as a technique to help learners in the early stages of their learning in order to get them to a point when the support is no longer needed and the learner achieves autonomy (Clarke, 2008; Engin, 2013; Anani & Gorbani, 2015; Gheisari, 2017).

Cooperative learning and experiential learning are two examples of ZDP and scaffolding. Cooperative learning is characterized as learners joining together as pairs or groups in their specific learning context (Millis, 2010; Slavin, 2011). In this manner, the collective power of learning in a group setting brings forth more positive learning results by enhancing critical thinking (Felder & Brent, 2007; Macpherson, 2007). Additionally, experiential learning aims to create possibilities for learners to learn through experiencing. Based on the Experiential Learning Theory (ELT), experiential learning is "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb 1984, p. 41).

As discussed earlier about the advancements of technology, new cooperative and experiential learning opportunities have emerged by the use of computers and internet. CALL or Computer-Assisted Language Learning is one instance which refers to the use of computers in language teaching and learning (Levy, 1997). On the other hand, MALL or Mobile-Assisted Language Learning pertains to language learning via the use of handheld mobile devices. Depending on the goals of learning and the types of learners involved various methods can be used to improve second language acquisition.

The Standards for Foreign Language Learning (2006), which was first published in 1996, described the purpose of language learning in the 21st century to have five main goals, better known as the five Cs:

1. **Communication:** The ultimate objective of language is presented as the success of communication between language users in real life situations. In this manner what one can do with the language (in both spoken and written communication) is of far more significance than how much, or to what extent, they know about the language.

2. **Cultures:** Understanding the relationship between one's own culture and the target language's culture is a fundamental goal for the improvement of one's language skills. Learning the similarities and differences about these two cultures helps language learners to be able to have deeper connections with one another.

3. **Connections:** Connecting through different disciplines is another key factor in effective language learning. Obtaining information from a wide array of viewpoints from around the world shapes the learners' comprehension of the essence of a language.

4. **Comparisons:** By comparing and contrasting one's own language and culture to a foreign language and culture, learners uncover the distinctive and identical qualities of each. They will also be able to recognize patterns and make predictions based on them. Moreover, in the process of making comparisons learners gain a better understanding of their native language and culture.

5. **Communities:** Living in a world that is more connected as the result of the constant enhancement of technology, allows people to engage in multilingual and multicultural communities that they did not previously have access to. Therefore, having the opportunity to connect with these new com-

munities emphasizes the aim of language learning to go beyond the language learners' immediate environment and close settings toward a more open, interconnected, and globalized society.

The revolution and rapid expansion of technology in its various forms such as media, digital resources, online learning games, educational websites, online course materials, and virtual reality, to only name a few, have provided language learners with a solid foundation and a variety of options to use in order to become fluent in their target languages. English as the dominant language of the Internet has made the communication and connection between numerous cultures and communities possible and accessible. Thus, by comparing and contrasting their communities and cultural communication norms language learners can achieve and surpass their five main goals of language learning in a much more efficient and expeditious way.

THE NEED FOR ALTERNATIVE METHODS

Even though various reasons some of which mentioned previously such as international immigration and interconnectedness of the world through emerging technologies have made the need for learning an international language a necessity, many learners and teachers around the world still struggle with the most efficient ways to reach this goal. This issue exacerbates when it comes to learning English by learners in countries where it is spoken as the native language. Culp and Schmidlein (2012), in their study found that 85% of new teachers only had seven hours or less training for teaching English learners in the USA. Throughout the last two decades numerous other studies have also reported that most teachers did not feel they were prepared to teach English learners after they completed their teacher preparation programs (Gándara, Maxwell-Jolly, & Driscoll, 2005; Nyberg, 2008; Lucas, Villegas & Freedson-Gonzalez, 2008).

On the other hand, the new tech-savvy generations require other forms of instruction that are not fully met by traditional methods of instruction (Kane, & Cantrell, 2010). Allen and Seaman (2013) noted that in the United States 6.7 million college students take at least one online course each semester. Many students are constantly distracted, and teachers find themselves searching for new techniques to keep them interested in classrooms. Electronic books, virtual classrooms, learning games, and online materials only scratch the surface of new technological demands of the learners. Therefore, finding novice ways of teaching and learning has become a priority for many educational institutions around the world. Using mixed-reality environments is one of the efforts to bridge the gap between the demands of language learners and the limited tools of teachers (Dieker, Grillo, & Ramlakhan, 2012; Mateu, Lasala, & Alamán, 2015).

MIXED-REALITY ENVIRONMENTS

Mixed-reality environments can be defined as the emergence of real-world spaces and scenarios with virtual elements and tools (Mateu et al., 2015). These environments can consist of two or three-dimensional computer simulations which use a combination of real-life participants and online personas or avatars. Recently, two main technological advances have been made to make mixed-reality environments a reality: Virtual Worlds, and Tangible Interfaces.

- **Virtual Worlds:** Mateu et al. (2015) divided virtual worlds into three main categories: communicative spaces, experimental spaces, and simulation spaces. Communication is the central point of communicative spaces. Using verbal or nonverbal interactions, participants can communicate with avatars and vice versa in mixed-reality environments. An example of such interactions may be the use of text or voice chat or gestures to get one's message across. Furthermore, a simulation space imitates the physical replica of a real-life space such as a classroom, university, court room etc. Lastly, an experimental space bring both the interactions and the virtual representation of places together by focusing on what activities participants can perform in these spaces.

Different variations of such mixed-reality spaces have been used in the military to train soldiers, in medical fields to prepare doctors and surgeons, and for pilots to practice their skills in simulated flight lessons. However, teaching and learning in other fields have only very recently and scarcely joined forces with mixed-reality environments.

- **Tangible Interfaces:** Physical objects can be used in mixed-reality environments in order to increase the quality of real-life experience of the participants. Direct contact with devices that influence the virtual world gives the participants a more natural sense of interaction. For instance, being able to grasp and use a steering wheel in a driving simulation space significantly enhances the realness of the experience for the users. Since mixed-reality environments have only been used in education recently, currently there are only a limited number of virtual worlds and tangible interfaces that will be discussed in the following sections.

MiRTLE

MiRTLE, also known as Mixed Reality Teaching and Learning Environment, can be defined as the point of clash between physical and virtual worlds. Developed at the University of Essex in the UK and the Shanghai E-learning Platforms, the fundamental idea of MiRTLE is similar to that of video conferencing in a classroom. In this mixed-reality environment classes can be held simultaneously for students in both actual traditional classrooms as well as in remote areas where students can create online personas for themselves to be present in class while teaching is taking place. The teacher stands in the real-life version of the class while in front of her (and in a location that can be seen by other students present in the class) a screen depicts virtual avatars of remote students all together seating in a classroom setting similar to those of the real one (Gardner, Scott, & Horan, 2008). The avatars substituting distant students can act as regular students, raise their hands, ask and answer questions during lectures. One of the main purposes of MiRTLE is to "foster a sense of community", "increase a sense of presence", and allow institutions to expand class size without having to undergo location changes (Gardner & Scott, 2008).

By eliminating the limitations that traditional classrooms impose on students for being in the same geographical location, MiRTLE opens its arms to a much wider audience worldwide. Therefore, the main use of this mixed reality environment is to bring together a larger group of learners regardless of where they reside. One of the major advantages of this quality is that it can possibly solve some of the issues international students face when deciding to pursue their education in foreign countries. Having the option of being able to be present in class and participate in class activities in real time while not physically present in the real classroom is a freeing experience. Moreover, by using MiRTLE more universities can open their doors to enthusiasts to attend their classes virtually and at the same time

benefit from the same qualities on-campus students enjoy. Going back to the goals of language learning discussed in the background section of this chapter, MiRTLE helps its users to connect on a much larger scale than they could otherwise. By creating communities from far and near, students and teachers are able to communicate with one another, ask and answer questions and learn from the same materials. For instance, students from many countries around the world can take part in the same English class via MiRTLE while still living in their own home countries and having the opportunity to share their cultures and learn the new language from authentic teachers and peers without immigrating to a new country.

Even though there are many advantages about using MiRTLE, a few disadvantages can also be observed. Based on the fact that MiRTLE operates by the use of internet connection, any potential technical difficulties or lack of high speed internet can easily result in some students not being able to be present during all or parts of the class time. The existence of a separate screen with off-campus students as avatars can also be distracting both for the instructor and other students in the real classroom. Consequently, if the avatar students have any questions during lectures or would like to participate in class activities, they may unintentionally be ignored since the instructor has to make sure he or she is paying attention to two sets of students simultaneously. Furthermore, the visuals of the student avatars can be improved to make the experience more realistic.

The MARVEL Project

Funded by the Leonardo Da Vinci Program for the European Community vocational training, the MARVEL project stands for *Vir*tual Laboratory in Mechatronics: Access to Remote and Virtual E-learning. By mixing reality and the virtual world this project connects vocational students from different places with online access to near and far real workshops and laboratories that they can virtually attend and learn from (Müller & Ferreira, 2003; Müller, Chilliischi, & Langer, 2012).

Similar to the advantages of MiRTLE, the MARVEL Project provides high quality and novel learning resources for its users which could not have been accessed otherwise. However, the difference between the two mediums is that the MARVEL Project does not require the students to have avatars or be part of a virtually-crafted classroom. The MARVEL Project acts more as an online learning tool rather than a simulated environment. With that factor in mind, the MARVEL Project does include simulated activities and tasks that learners can perform online to help them in learning new skills based on their line of work. For instance, the users can use tools or work with simulated machinery to perform select tasks based on their needs and requirements.

TIWE Linguistico

Created by the efforts of researchers at the University of Salento in Italy, TIWE Linguistico is a competition-based program that consists of virtual players and events as well as real ones to improve language learning outcomes of students. Inspired by the novel "The Hound of the Baskervilles" written by Sir Arthur Conan Doyle, English learners are divided into two groups of competitors (Fiore, Mainetti, Patrono, & Vergallo, 2013). While one team (3D Group) is in charge of solving a criminal case by finding alibi and potential weapons in a virtual world, the other team (Sherlock Group) needs to find answers to a set of questions by using an application on their smart phones in the real world. Both of the teams have to work together in order to solve the case by participating in a Collaborative Virtual Environment (CVE) that can take place across different physical locations. The goal of this technology is to renovate

traditional teaching environments and build a new route for learners to refine their language skills (Fiore, Mainetti, & Vergallo, 2014).

TIWE Linguistico can be considered as an example of MALL or Mobile-Assisted Language Learning and CALL Computer-Assisted Language Learning. The competitive and game-like aspects of TIWE Linguistico set this environment apart from the other mixed-reality environments mentioned previously. While using TIWE Linguistico learners communicate with one another, connect through their shared goals, and compare each other's scores/learning outcomes, thus creating a learning community in the process. Therefore, the advantage of using an environment such as TIWE Linguistico is that it brings learners together by using cooperative and experiential learning and enhancing teamwork as well as language skills. However, considering the nature of the program, it might be more appropriate for younger learners rather than older ones. Moreover, since the environment thus far has been created for one specific novel only the longevity of the use of it could be threatened. Therefore, by developing more scenarios and activities based on other novels or stories TIWE Linguistico can attract a wider audience and provide more learning opportunities.

SMALLab

A tangible interface is the main component of SMALLab which was initiated by the collaboration between educators, scientists, and engineers at Arizona State University. Consisting of an interactive surface that is augmented by a video projector from above, students can enter and exit this virtual surface at any time. A 3 dimensional object tracking system in addition to audio speakers and tracked physical objects create a space for learners that takes them away from the traditional form of tables, chairs, teacher and a board in a classroom to a much more active and collaborative environment(Tolentino, Birchfield, & Kelliher, 2009). Teachers can use this technology to teach students a variety of lessons such as physics and chemistry lessons where they can see a 3D representation of the objects they are studying. Students can move around across the SMALLab's cube-shaped space and interact with one another in real time and the topics they are learning about by using different "dynamic visual, textual, physical and sonic media" (Mateu et al., 2015).

SMALLab is an excellent example of the endless possibilities a tangible interface can offer in the world of mixed reality and virtual reality. By getting the learners up from their seats and into the wonderland it creates, the learners can see, touch, feel, and experience learning as it is taking place. For instance, for learning colors in a new language the learners can be faced with a giant detailed color wheel projected from the video projector on the floor with all the colors labeled so they can all see, read out loud, and practice together. They can also play games or activities based on each lesson using different tools SMALLab entails such as the object tracking device. There are many positive attributes and possibilities SMALLab can supply, however one disadvantage of it is that it works best for small classes with fewer students due to the limited space available for all students to interact with the tangible interface.

Virtual Touch Toolkit

Established by the Autonomous University of Madrid, teachers can use Virtual Touch Toolkit to create innovative educational activities for students in a mixed-reality environment. Giving teachers and students a sense of "telepresence" is one of the goals of Virtual Touch Toolkit that has been put to test in high schools in Spain (Mateu, Lasala, & Alamán, 2014). Based on the finding that some teachers may lack

computer programming knowledge and skills, the creators of Virtual Touch Toolkit aimed to construct a system that can be used across a spectrum of adaptability according to the electronics and computer programming abilities of the users. Basic, intermediate, and advanced users can work on designing different learning materials for their learners by combining real-life and virtual elements (Mateu et al., 2015).

Similar to the MARVEL Project, Virtual Touch Toolkit makes learning accessible for students from all levels of skills and abilities. Moreover, Virtual Touch Toolkit creates a learning platform for teachers as well. Teachers can adjust their own level of involvement with Virtual Touch Toolkit based on their knowledge of programing and their interest in learning about constructing new materials for students. The variety of topics which can be taught using Virtual Touch Toolkit is vast. For instance, for teaching English teachers can create an environment where learners need to identify or describe different objects/places to their partners or in group settings. Hence, among the advantages of the Virtual Touch Toolkit is the flexibility of its use and its learning potential for both students and teachers. On the other hand, the same quality can be thought of as a possible disadvantage since it can add to the complexity and confusion for both learners and teachers if not utilized correctly.

SimSchool®

SimSchool®, a joint effort of educational scientists of the University of North Texas and the University of Vermont, is an online teacher training program in which teachers can create avatars to act as students in their classroom. By using this platform teachers get the opportunity to practice their teaching skills such as lesson planning, designing tasks, and testing class management techniques. SimSchool® provides teachers with a safe environment with unlimited access for repeating lessons, receiving constructive feedback, and working with diverse or homogenous groups of students (McPherson, Tyler-Wood, McEnturff, & Peak, 2011).

An exceptional advantage of using SimSchool® is the unlimited practice teachers can get by creating student avatars with different characteristics and learning needs, making a selection among millions of learner profiles, dialogues, and data. Teachers or teacher candidates can choose their own level of involvement with the program and gain as much experience as needed by putting themselves in various teaching scenarios that they can potentially face in real life. In this manner, not only teachers can learn from their mistakes but there are also no real students to suffer the consequences of their mistakes. SimSchool® can also be used for professional development for in-service teachers who would like to have more experience with situations they have not yet experienced or have experienced and did not know what would be the best way to handle them. For instance, teachers can create a scenario in which one student bullies another student and they have to decide how to react to the situation at hand.

Second Life

In *Second Life* users can play both the role of a student or a teacher. Established by the American company Linden Lab, in this immersive virtual world users can create their own avatars and select how and what they would like to learn. There is a variety of pre-made learning scenarios and environments that users can select from; for instance, the user as a student can choose to go through a major historical event regardless of the date and experience what happened during that time period through the avatar they had fabricated. This immersive virtual environment also allows the users to pick self-guided or expert-guided learning adventures (Klein, Freitas, Machado, da Silva Freitas, Graziola, & Schlemmer,

2014). During self-guided learning trips the users can choose to independently experience from an array of replicas of real-life learning materials, such as virtual duplications of museums, art galleries, and historical artifacts. On the other hand, by selecting the expert-guided tours an expert or a teacher accompanies the users and explains the details about the selected learning components (Wilks & Jacka, 2013). *Second Life* also provides the option for teachers to rehearse their lesson plans by using the virtual blackboard and a classroom with avatars as students. SimSchool® and Second Life are similar in terms of their video-game like characteristics and appearances which make the users' experience more interactive and amusing (Jacka & Ellis, 2010).

TLE TeachLivE™

TLE TeachLivE™, developed at the University of Central Florida, is a mixed reality classroom environment which consists of 5 main avatars acting as students in a virtual classroom. TLE TeachLivE™ is used for teacher training and professional development purposes for pre-service and in-service teachers in areas such as mathematics and sciences, social studies, special education, gifted learners as well English learners' instruction. This virtual classroom provides teacher candidates (TCs) with a safe environment to practice their teaching strategies and skills without having any negative effects on the learning experience of real students (Andreasen, & Haciomeroglu, 2009; Dieker, Grillo, & Ramlakhan, 2012; Regalla, Nutta, Hutchinson, & Ashtari, 2016).

"No students were harmed in the making of this teacher" is the motto TLE TeachLivE™ utilizes to symbolize the key goal of the program. Teachers can implement and repeat teaching their lessons as many times as needed while "incorporating the critical components of personalized learning, suspension of disbelief and a cyclical process" (Dieker, Straub, Hughes, Hynes, & Hardin, 2014, p. 25).

The EL TLE TeachLivE™ which is the English Learner version of this simulated environment allows teachers to examine different teaching methodologies and classroom management skills they have theoretically learned in their teacher preparation courses. This virtual classroom is formed by five students: three English learners and two native English speakers. Long-term and extensive research was conducted by Nutta, Mokhtari, & Strebel (2012) in order to create the EL avatars that are represented in this mixed reality environment. Observations, interviews, and examination of oral and written data resulted in three main cases that best portrayed three main levels of proficiency in the English language: beginning, intermediate, and advanced. Nutta, Strebel, Mokhtari, Mihai, and Crevecoeur-Bryant (2014) mapped out each avatar and the level they represent as the following:

- **Beginning Level:** Edith is the name of the virtual student representing the beginning level language proficiency in English. Edith has limited vocabulary base in English. Simple yes/no questions, one word or non-verbal responses best describe her comprehension level.
- **Intermediate Level:** Edgar personates the intermediate level of proficiency. Even though Edgar can comprehend most questions and is able to respond with broken English, his language skills might lack in terms of complex grammar structures and new vocabulary. Grammatical errors or mispronunciation of words can be noticed frequently in Edgar's speech.
- **Advanced Level:** Tasir portrays common characteristics of an advanced English learner. At first encounter Tasir may be able to pass as a native speaker of English, however during some interactions as well as in academic language use such as writing and reading she faces some difficulties.

The two other students in this simulated class are Sean and Ed who are native speakers of English. An advantage of this mixed reality environment is that each of the characters in the EL TLE TeachLivE™ has his or her own personality traits which make the interactions between teacher candidates and the avatars a unique experience. The diversity of this virtual environment can also benefit teacher candidates who have not had any previous experience with teaching students with different racial and cultural background specifically if they will be teaching in areas that have large immigrant population (Regalla, Nutta, Hutchinson, & Ashtari, 2015). Understanding students' individual differences and language needs is another advantage of using this mixed reality tool (Dieker et al. 2014; Regalla, Nutta, Hutchinson, Jones, Ashtari, & Verkler, 2014). On the other hand, among the limitations of this mixed reality environment the high financial cost of the experience due to the number of staff (both on the educational and technical side) that is needed to operate the system as well as the amount of devices it requires such as TVs, computers, projectors, Kinect tracking devices, etc can be named. Similar to most of the other VR worlds examined previously, TLE TeachLivE™ also works via internet and unexpected technological glitches and difficulties can result in not being able to use the program properly.

TLE TeachLivE™ can be used in various ways. Generally, there is a large TV screen or projector which shows the 5 student avatars seating in their seats in a virtual classroom. The users then need to stand in front of the screen using a portable microphone and tracking device which can be carried similar to a necklace. The user plays the role of the teacher while a "coach" or an expert teacher trainer observes the interaction, takes notes of the positive and negative teaching techniques used and how the user can improve his or her teaching strategies. Since the avatars are not real students the coach is able to pause the program at any time during the interaction and give feedback to the user or can wait until the session is over and then discuss the notes separately.

Due to the fact that TLE TeachLivE™ is a combination of simulation, experimental, and communicative virtual spaces there are many activities that can be done. One of the activities for teacher candidates which can be used with the English Learner version of the TLE TeachLivE™ is to practice asking leveled-questions based on each student avatar's level of proficiency in English. For instance, the TC can bring a photo or point to different objects in the classroom (student avatars are able to see, recognize, point to, and identify objects in pictures and classrooms) and ask questions that are ranging from beginning level to intermediate and advanced level based on the student from whom the questions are asked. An example of such interaction can be similar to the conversation shown in Table 1.

In the hypothetical interaction above the TC asks leveled-questions which were appropriate for each level of proficiency. However, in the early stages of teacher training, many teacher candidates (especially

Table 1.

TC: Hi Edith, can you point to the whiteboard please?
Edith: (beginning level student points to the board).
TC: Good job, Edith. What color is this? (While holding a red marker in her hand)
Edith: Red
TC: Thank you, Edith. Edgar (intermediate level student). What did you do last weekend?
Edgar: (with some pause and mispronunciation/grammar errors responds) I went with my family to park. It was good weather.
TC: That sounds amazing, Edgar. Tasir, do you have any plans for this summer?
Tasir: (as an advanced learner who moved to the US at an early age responds confidently and with no trace of accent or grammar errors when it comes to everyday conversations, however when it comes to her reading and writing she is not at the same level as her native English speaking peers yet) Yup, we're gonna go on a cruise with my family and my cousins. I can't wait, it's gonna be so much fun!

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those who speak English as their native language) have difficulty forming questions that are at the level of proficiency of English learners. For example, the interaction shown in Table 2 is not uncommon in the early phases of teacher training with the EL TLE TeachLivE™.

The examples above are only simple depictions of how the EL TLE TeachLivE™ can be utilized in teacher training programs. There are also numerous scenarios that can be used to practice teaching skills for pre-service or as professional development for in-service teachers. These teacher training programs can not only prepare English language teachers in a world which is constantly moving toward globalization, but they can also assist in training teachers in other subject areas who have English learners in their classrooms. The importance of having effective teacher training tools such as EL TLE TeachLivE™ is maximized in countries where large populations of immigrants reside. As the number of English learners goes up consistently in such areas, it is vital to have skilled teachers who are fully prepared and ready to offer their knowledge and guidance to help those learners achieve their language learning goals as well as life plans in their new countries. By using this mixed reality environment all 5 Cs of language learning can be fulfilled while providing scaffolding in cooperative and experiential learning. Through the communication between native and non-native English speaking peers and the communication between teachers and students as well as teacher trainers and teacher candidates in the preparation program, all parties involved can connect to each other and learn about one another's culture by comparing their own and form their unique communities as the result of their interaction. Furthermore, by using the World Wide Web and international usage of new technologies learners and teachers around the world can connect, learn about their viewpoints, similarities and differences, and create strong communities on a much larger scale based on their shared values.

CONCLUSION

In this chapter the significant value of using new teaching and learning methods was explained by providing an overview of the effects of globalization, mass immigrations, and constant advancements in technology. Mixed reality environments including virtual worlds and tangible interfaces were defined. MiRTLE, The MARVEL Project, TIWE Linguistico, SMALLab, Virtual Touch Toolkit, SimSchool®, Second Life, and TLE TeachLivE™ were among the examples of virtual reality technologies examined in detail in regards to their contributions to the field of education, teaching and learning English. How teachers and students can benefit from these virtual spaces was investigated. By using mixed-reality environments teachers can gain more experience in order to move across the spectrum from the novice

Table 2.

TC: Edith, what do you wanna be when you grow up? (TC speaks quickly with no pauses or clear pronunciations of each word to make it easier for a beginning level English learner to understand) **Edith:** (stares at the teacher blankly, unable to respond with a confused look on her face) **TC:** (repeats her question without making any changes, slowing down her speech, using gestures, or visual clues) what do you wanna be when you grow up? **Edith:** (uncomfortably and unsuccessfully looks toward her classmates to help her understand what the teacher is asking her) [At this point the coach or the expert teacher trainer pauses the program and asks the teacher candidate what he or she thought went wrong during her interaction with Edith. The coach and TC discuss their points of view and the coach gives the TC some strategies that she can use to simplify her language such as talking more slowly, asking yes/no questions, or giving Edith simple options such as "a teacher or a doctor?" ideally accompanied with pictures to show her.]

Table 3. Summary of mixed reality environments

Mixed Reality Environment	Creator(s)	Usage
MiRTLE	University of Essex (UK) Shanghai E-learning Platforms (China)	Simultaneous video conferencing for students in a real classroom as well as remote students in a virtual class
The MARVEL Project	Leonardo Da Vinci Program European Community vocational training	Online access and virtual presence in real workshops and laboratories regardless of distance
TIWE Linguistico	University of Salento (Italy)	Competition-based program of virtual players and events of a story in a virtual world
SMALLab	Arizona State University (USA)	Interactive surface with 3D object tracking system creating a more active and collaborative environment
Virtual Touch Toolkit	Autonomous University of Madrid (Spain)	Toolkit providing teachers with different levels of tools/programs to create educational activities in class
SimSchool®	University of North Texas University of Vermont (USA)	Online teacher training program with unlimited access for practice
Second Life	Linden Lab Company (USA)	Immersive virtual environment for both teachers and students to experience pre-made or new learning scenarios
TLE TeachLivE™	University of Central Florida (USA)	Virtual classroom with 5 main avatars as students developed for teacher training purposes

phase to expert and learners with different learning styles can largely benefit from the variety of learning scenarios they are provided by using this technology. In other words, mixed reality environments have the potential to "allow individuals to have repeated trials involving high stakes situations without risking the loss of valuable resources (e.g., money, time, and people)" (Dieker et al. 2014, p. 22).

However, it is important to note that up to this point in time none of the technologies discussed in this chapter is intended to fully replace other more traditional forms of learning or instruction. The main purpose of using mixed-reality environments in teaching and learning so far has been to supplement, facilitate, engage, and innovate. Whether such innovations will solely be adequate substitutes for future learning and teaching is an issue that will need more trial and error as well as higher quality in addition to various resources, such as spatial, temporal and financial, that many educational facilities around the world might lack. However, the future of teaching and learning appears to be full of new possibilities and bright horizons to be further examined and explored.

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KEY TERMS AND DEFINITIONS

CALL: Computer-assisted language learning.
CVE: Collaborative virtual environment.
ELs: English learners.
ELT: Experiential learning theory.
IEP: Intensive English program.
MALL: Mobile-assisted language learning.
Mixed Reality Environments: A combination of real-world and virtual features that can be used for different purposes.
SCT: Sociocultural theory.
SL: Service learning.
TC: Teacher candidate.
TESOL: Teaching English to speakers of other languages.
TL: Target language, a language one learns that is not his/her first language.
VR: Virtual reality.