

# ReDesigning intercultural exchanges through the use of augmented reality

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**Abstract.** While the debate on breakthrough technologies has focused on inept, dexterous, and socially transforming technologies such as Artificial Intelligence (AI) assistants and robot dexterity, in second/foreign language learning, particular emphasis is placed on AI, Augmented Reality (AR) and Virtual Reality (VR). This study takes a closer look at the role of three newly developed AR applications in promoting a better understanding of complex concepts such as the Zone of Proximal Development (ZPD), strategies in dealing with disruptive students, and an immigrant's perspective in moving to a foreign country with no knowledge of the language(s) spoken in that country. The AR applications were developed and implemented during intercultural exchanges among students enrolled in academic institutions in the UK and Cyprus. The aim was to develop AR applications that were geared toward the learning needs of future language teachers and examine what students could achieve through the use of these applications during goal-driven tasks and activities.

**Keywords:** augmented reality applications, intercultural telecollaboration, multimodality.

## 1. Introduction

In the 'New Media Consortium (NMC) 2018 Horizon Report: Higher Education Edition' (Becker et al., 2018), it is acknowledged that AI, VR, and AR will have an impact on the assessment and planning of higher education institutions between 2018 and 2020. Educators are expected to explore the pedagogical value of novel technologies in different teaching, learning, and training contexts, but are rarely

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offered opportunities to develop the required skills (Kessler, 2006). Further, in many cases digital tools are integrated into the curricula without a solid pedagogical value. The role of context-based AR applications and task-based learning have been investigated in several studies in second/foreign language learning, but this area is still in its early stages (Godwin-Jones, 2016). In the ReDesign project, an online platform, ReDesign, was developed to facilitate collaboration through joint lectures, tasks, and activities between academic institutions. QR codes, lectures, interactive activities, and AR applications were developed. The AR applications were designed to immerse students in a game-like environment by combining elements of the physical and virtual world and interacting with 3D objects and their peers, and engaging in pedagogically-driven activities (Bower et al., 2014; Yilmaz, 2016). Drawing on situative and ecological theory, the focus was placed on what students could do if they were offered the opportunity to interact with AR applications in particular contexts (Gresalfi, 2015). This step would also guide students in experimenting with technologies that are not commonly used in classroom contexts. The first AR application featured the ZPD animating in 3D the process of internalization. The second AR application featured three scenarios of a disruptive learner inviting students to select the best possible approach in dealing with disruptive behavior. The third AR application focused on an alien landing on earth, simulating the experience of immigrants moving to another country with no proficiency in the target language(s). Three research questions were addressed in this study.

- (1) What are some of the pedagogical foundations upon which the AR applications were designed?
- (2) What are the aims and objectives of each AR application?
- (3) In what ways did students implement these AR applications in learning?

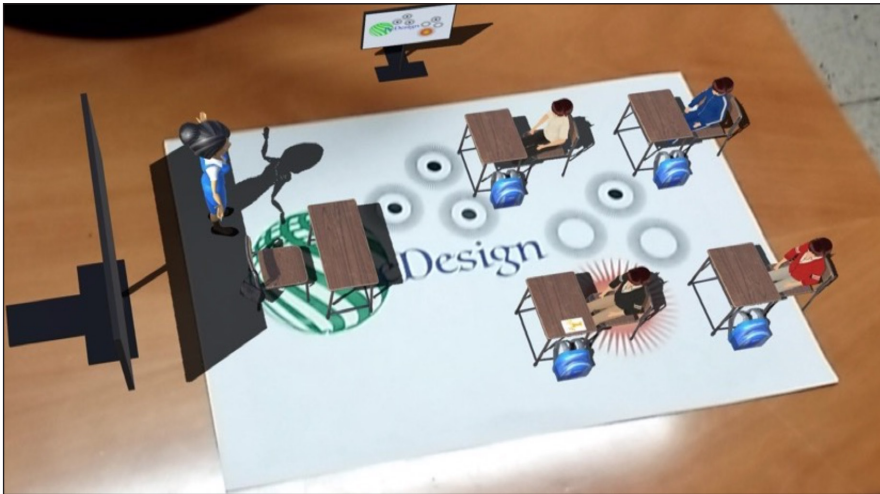
## 2. Method

Fifteen Greek-Cypriots experimented with the ZPD AR application during the fall of 2018. In the spring of 2019, three sets of students participated in the study: 14 students in their first year of their bachelor's degree in education in an academic institution in Cyprus and two sets of students from an academic institution in the UK, 13 students were enrolled in an Intercultural Communication course, and six graduate Chinese students were enrolled in a professional training course in Teaching

Chinese as a Second Language. The ReDesign platform was developed to mediate these collaborative lectures and activities. It featured live chat sessions, a wall, friends, groups, assignments, and multiple other tools. In this study, the platform was used to mediate students' written interactions. Prior to the development of the apps, IT professionals, applied linguists, and educational technologists exchanged views on the added pedagogical value of each AR application. Using Unity Engine, three AR applications were developed: (1) the ZPD, (2) a disruptive student, and (3) an alien application. The AR applications could be accessed individually or in groups using a mobile device.

The ZPD featured three 3D concentric circles: the inner circle indicating what 'learners can do unaided', the second circle noting what 'learners can do with guidance' and the largest one featuring what 'learner cannot do'. The second AR application featured three different approaches in dealing with disruptive student behavior: (1) ignoring a student's cell phone use in class, (2) acknowledging a student's cell phone use in class and pointing to his/her poor academic performance, and (3) kindly requesting the cell phone and placing it in a Ziploc bag. [Figure 1](#) illustrates the disruptive student application.

Figure 1. The disruptive student AR application



The third AR application featured an alien landing on earth with no proficiency in the target language. The three AR applications were designed to promote understanding the ZPD, exploring classroom management approaches, and provoking critical discussions on culturally and linguistically salient values. Students were invited

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to complete a set of tasks on each of these AR applications, such as exploring the concept of ZPD and identifying students' current knowledge and future prospects of building new knowledge. All tasks were posted on the ReDesign platform under 'Assignments' and shared on students' walls in order to be accessible to all their peers.

### **3. Discussion**

The three questions addressed involved the pedagogical value driving the design of these AR applications, their aims and objectives, and students' implementations in different contexts. The first element driving the AR application design was their 'added pedagogical value'. Building on previous studies related to the implementation of tools and applications in the classroom context, the research team contemplated multiple principles, including (1) the contexts in which they would be implemented, (2) integration into the curricula across academic institutions, (3) relevance to students' learning, (4) practicality, (5) level of complexity and time required to navigate through the applications, (6) the enactment of affordances for engagement, (7) the promotion of interaction and intercultural collaboration, and (8) the promotion of conceptual understanding through goal-driven tasks.

The goal was to examine what students could achieve if the AR applications enacted affordances for engagement in goal-driven tasks and intercultural exchanges. During the actual implementation of the AR applications, students could interact with the ZPD in AR rather than simply memorizing some of its constructs. They could also reflect on the complexities involved in identifying students' future psychological development. Students were introduced to the target image in class and were invited to access the AR application. Some students encountered difficulties since the application was only accessible on Android devices. However, most students navigated through the AR applications and assisted their peers. The disruptive student application was more complex since it included three different scenarios in effectively handling disruptive student behavior; it combined audio, real and AR objects, animation, and user-interface information. Students were invited to make decisions in dealing with disruptive student behavior, such as cell phone use in the classroom, and engaging reserved students. In this case, it took a little bit longer to experiment with all three scenarios and understand both the written and oral conversation in the three scenarios. However, classroom management was a topic that students across academic institutions could relate to and enacted affordances for thinking more critically about the best approach possible in such cases.

The alien AR application was more ambitious than the rest of the applications. Students interacted with an alien that had just landed on Earth, contemplated on the role of language and culture, and identified salient cultural artifacts and posted their reflections on the ReDesign platform. Some of students' proffered cultural artifacts were created in AR, such as a bus and kolokasi (a sweet potato). This AR application enacted affordances for thinking more critically about the linguistic and cultural artifacts that are salient to each culture but which immigrants moving to a new country are not familiar with. Students implemented this AR application in a more creative and constructive way, providing artifacts that are rarely discussed.

#### **4. Conclusions**

In the case of AR technologies, challenges often emerge with the design of applications that are pedagogically sound, are developed with specific tasks in mind, and can be integrated into the curricula to promote understanding of complex constructs, interaction with artifacts and peers, collaboration, and learning in environments where virtual and real objects coexist. It is instrumental for AR applications to have specific aims and objectives and be explicitly conveyed to students. Applications can progress from simple to more complex ones, and students can be gradually involved in the process of interacting with the AR scenarios, making choices and contributing to the design process by identifying cultural artifacts that can be integrated into the AR applications. This step turns learning immersive and engaging and offers students an opportunity to reflect on their salient cultural values and artifacts.

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