

(Re)Designing Augmented Reality Applications to Facilitate Intercultural Telecollaboration

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Abstract: This paper draws on design-based research to develop a real-world classroom Augmented Reality (AR) scenario, which was accompanied by tasks used to mediate intercultural telecollaboration. It investigates the role of these tasks and AR scenario in enacting affordances to enrich students' learning experiences, to establish a connection between classroom management techniques, their local context and future teaching practices and to promote insightful reflections on such practices. The trajectories upon which these tasks were designed were practice-oriented, where students were invited to explore three options in dealing with classroom misbehavior and reserved students. Using their mobile devices, students could view in AR a classroom setting, a student's disruptive behavior and three possible approaches in dealing with such behavior. Upon exploring the three options in handling classroom misbehavior, students across the two participating academic institutions in Europe could post their comments on a newly created platform, ReDesign.

Keywords: Augmented Reality (AR), intercultural telecollaboration, Learning Management System (LMS), language learning.

Introduction

In the pursuit of novel paths to leverage the constellation of constantly evolving technologies to expand the trajectories of learning, collaboration and intercultural understanding among students across academic institutions, intercultural exchanges were initiated by a pool of ITs, a researcher, an educational technologist a teacher trainer and applied linguists in multiple academic learning contexts in Cyprus and the UK (Belz & Thorne, 2006; Thorne, 2003; O'Dowd, 2016; Avgousti, 2018). In informal contexts, the avalanche of games, collaborative platforms, applications and tools have expanded exponentially the affordances and contradictions in intercultural exchanges, language learning, collaboration, cultural understanding and communication. This rich and diverse implementation of virtual exchanges across geographic locations, disciplines, modes of communication, and tools and applications, intercultural communication has also generated multiple definitions, which turned intercultural communication into a polysemous term. As O'Dowd (2018) succinctly notes, the integration and diverse uses of virtual exchange in different fields of education and contexts have generated "different monikers and terminology depending on the educational context and the pedagogical focus of its practitioners" (p. 2). In this paper, virtual exchange which is also commonly referred to as intercultural telecollaboration is defined as a collaborative and interactive endeavor during which interlocutors in different geographic locations engage in exchanges mediated by different tools and applications in their pursuit of joint goals and knowledge (Sadler & Dooly, 2016; O'Dowd, 2018).



Launching successful intercultural telecollaboration calls for the contemplation of a constellation of decisive factors and meticulous cross-institutional planning, organization, implementation and constant evaluation and adaptation of the material and activities. Intercultural telecollaboration does not involve *impromptu actions* but rather entails long commitment and dedication in order to achieve the required goals and outcomes. As Sadler and Dooly (2016) postulate, “Knowing how to create optimal language learning conditions for ‘distributive knowledge’ can be a real challenge for teachers, especially creating conditions for multiple experiences of sharing and participating for their students in embedded, meaningful activities with others, both locally (for example, their classmates) and globally (for example, online peers)” (pp. 401-402). Some of the interrelated variables that instructors need to contemplate when engaging in intercultural telecollaboration include institutional curricula, policies and requirements, technological infrastructure and support, academic calendars, students’ schedules, tools employed to mediate intercultural telecollaboration, the nature and duration of activities, students’ linguistic proficiency in the target language and level of motivation, instructors’ area of expertise, investment and goals.

Tool deployment and their everyday use are determining factors in enacting both affordances and contradictions during language learning and collaboration. As Thorne (2003) postulates, these tools or artifacts are molded and defined by the users. In second and foreign language learning, a wide multiplicity of tools have been deployed including emails, instant messenger, various Learning Management Systems, blogs, Virtual Worlds, Skype, and games (Thorne, 2003; Belz, 2003; O’Dowd & Ritter, 2006; Basharina, 2008; Hadjistassou, 2016; Hadjistassou & Molka-Danielsen, 2016; Sadler & Dooly, 2016). At the same time, a wide repertoire of activities and tasks were implemented during these intercultural exchanges.

More recently, some studies have focused on the integration of structured activities and the design, development and deployment of novel AR technologies in second and foreign language contexts. Augmented Reality enacts affordances where real-world content interacts with virtual context. In their definition, Ibáñez and Delgado-Kloos (2018) note that “Augmented Reality (AR) is a 3D technology which merges the physical and the digital worlds in real time” (p. 110). Dunleavy, Dede and Mitchell (2009) postulate that AR has the capacity “to create immersive hybrid environments that combine digital and physical objects, thereby facilitating the development of processing skills such as critical thinking, problem solving, and communication through interdependent collaborative exercises” (p. 20). In their systematic literature review on the studies implementing Augmented Reality in educational contexts, Bacca, Baldiris, Fabregat, Graf and Kinhuk (2014) note that 40.6 percent of the studies focused on the implementation of AR in science and only 21 percent of the studies in this area were in the “Arts and Humanities,” such as language learning.

However, Augmented Reality needs to be explored further in order to develop a better understanding of their role and added value in second/language learning contexts. As Dunleavy, Dede and Mitchell (2009) indicate, “we are only beginning to understand effective instructional designs for this emerging technology” (p. 20). Currently, in second and foreign language, there is a limited repertoire of AR-mediated applications designed to promote second and foreign language learning. Most importantly, this line of work should be expanded within the trajectories of intercultural telecollaboration where there is limited work on the role of Augmented Reality and structured goal-oriented tasks in

mediating such artifacts to promote second language learning and collaboration that is grounded on *experiential learning* (see Barab, Tuzun, & Thomas, 2005) and *design-based research*. To achieve this goal, Augmented Reality application should be designed, developed and deployed based on the students' specific learning needs and challenges that emerge from actual everyday professional practices.

Research Questions

Drawing on this need to explore the role of Augmented Reality applications during intercultural exchanges, this paper describes a novel initiative undertaken to design and integrate AR scenarios to facilitate long-distance exchanges among students in the UK and Cyprus during the academic year of 2018 and 2019. The focus is placed on the "disruptive student application" and students' reflections on the ReDesign platform. The study addresses the following research questions:

- (1) How can design-based research be adopted to design and develop an AR application that draw on real-life classroom practices to promote reflections on disruptive classroom behavior during intercultural exchanges?
- (2) How can this AR application be used to enact affordances for reflective comments among students across academic institutions on disruptive classroom behavior?

Theoretical Underpinnings and Research in Intercultural Collaboration

Delving into the complex ecology of intercultural telecollaboration warrants the need to examine the underlying mechanisms which contribute to the enactment of affordances as learners explore and deploy tools and applications to innovate; navigate through and participate in the complex terrain of communication that emerges in virtual contexts; build new meaning, discourses and knowledge; interact with other online users and technology; and construct new skills. Van Lier (2006) defines an affordance as "a relationship between an organism (a learner, in our case) and the environment, that signals opportunity for or inhibition of action. The environment includes all physical, social and symbolic affordances that provide grounds for activity" (pp. 4-5). In ecology, the nature of tasks used to mediate such exchanges, their authenticity, the type and design of tools and applications, their availability, accessibility and appropriateness, and students' learning needs, as well as the pedagogy driving the use of these technologies, needs to be examined. Ecology invites the investigation of the context in which the activity actually emerges, as well as the processes, actions and cultural artifacts that help build this knowledge. In this ecosystem, classrooms, formal institutional environments and teacher-led instruction are not the sole providers of knowledge. Virtual environments mediated by different tools and applications can also afford constructive affordances for learning, interaction and skill building. As a result, their design should be embedded in real-world practices, as they emerge in actual contexts.

Intercultural exchanges are facilitated and realised by these different tools and, at the same time, they extend the trajectories of context and action beyond the institutionally and geographically contingent boundaries. However, intercultural exchanges are neither linear nor devoid of the cultural and historical contexts in which they unfold. Thorne (2003) indicates that intercultural collaborations are contingent upon "the cultures-of-use of Internet communication tools, their perceived existence and on-going construction as distinctive cultural artifacts, differs interculturally just as communicative genre, pragmatics, and institutional context would be expected to differ interculturally" (p. 38).

Within these theoretical trajectories, then the design and deployment of such tools is culturally embedded and often driven by real-world practices that also have an impact on the learning processes (see Barab & Squire, 2004). For instance, “Design-based research involves introducing innovations into the booming, buzzing confusion of real-world practice (as opposed to constrained laboratory contexts)” (Brown, 1992, p. 92) and at same time investigating the impact of this design work on learning (see also Barab & Squire, 2004).

Apart from these culturally contingent tools and applications, tasks can form culturally mediated artifacts that can facilitate or impede intercultural telecollaboration. In this case, institutionally-embedded intercultural telecollaboration, well-structured and implemented tasks offer an added value in immersing students in intercultural telecollaboration and contributing to their engagement in the pursuit of joint goals. Their alignment with the curricula, instructional material, course goals and objectives also play a core role in the design of these activities. The design and implementation of specific tasks during intercultural telecollaboration varies from well-structured tasks to hands-on approaches and flexibility in the type of tools used to mediate the communications, instructors’ roles, goals, and materials.

Building on their twelve-year study of fruitful engagement in intercultural collaboration, Sadler and Dooly (2016) provide a total of eight principles guiding their practice: (a) effective student preparation on activities, expectations and enhancement of cultural understanding; (b) emphasis on the value of engagement in intercultural collaboration; (c) advance introduction to proper online etiquette; (d) allocation and design of ice-breaker activities; (e) advance scheduling of group work based on students’ schedules; (f) gradual integration of simple to more complex tasks; (g) self-monitoring of their own progress; and (h) evaluation of one’s work and fellow students’ evaluation.

Type of Activities Designed and Integrated to Mediate Intercultural Telecollaboration

As Chapelle (2007) succinctly notes, language teachers strive to become acquainted with and use specific software and the development of learning tasks that can be mediated by new technologies. However, Chapelle (2007) warns that “judgements about what learners might do as they work on particular CALL activities, which are sometimes captured in the names of those activities (e.g., drill, quiz, communication task), do not necessarily denote that students will actually do with activities” (p. 35). In a similar vein, Cultural-historical Activity Theory distinguishes between tasks and activities (Lantolf & Thorne, 2006). Building on these theoretical trajectories, Sykes and Reihardt (2013) advocate that “all human activity is mediated by artifacts, whether language, experience, or tools such as tasks. Each individual brings varying motives, which are usually socially constructed, to a particular activity... If learners’ interpretations of a task do not align with those of the instructor and curriculum, the outcome may be counterproductive for future experiences” (p. 17). Carefully designed authentic tasks can enact affordances to engage language learners in culturally and linguistically rich learning experiences and promote agency.

In intercultural telecollaboration, there is a rich tapestry of tools and tasks integrated during collaborations among participants in geographically distant locations. For instance, Thorne (2003) delves into the use of “chat” sessions in preparation for engagement in intercultural exchanges with lycée students in France on socially and culturally impassionate issues, racism and stereotypes

emerging through movies. Chen and Yang (2014) describe the use of weblogs, iEARN forums, emails and Skype among students from Taiwan and Dubai and Taiwan and the United States who collaboratively composed, posted and offered feedback on folk tales in the project forum, exchanged folk stories with peers in Pakistan, and exchanged emails on topics of their choice with students in the United States. Ryshina-Pankova (2018) discusses the integration of blogs and websites during intercultural exchanges among American and German students where participants were exposed to journalistic articles and movies on socially and culturally salient topics, such as “*Soccer Patriotism and National Identity*” (p. 224), and engaged in chat discussions, which guided in contextualizing these heated topics, and questions on the reading assignments, personal experiences and attitude towards these issues.

Hadjistassou and Molka-Danielsen (20016) discuss the enactment of a murder mystery in the Chatterdale Village in OpenSim while students in Austria and Germany solve a murder mystery. The tasks include written reports, collaborative work and interaction with virtual characters and distant partners. Virtual learning environments imposed a greater challenge on educators since the nature of the environment often diverted students’ attention, so tasks needed to be structured and explicit, with clear guidelines, and often required the use of alternative tools such as Skype, email and Facebook. The cross and interdisciplinary integrations of intercultural exchange, diverse nature and institutional, discipline, teaching and research fragmentation, generated a rich and heterogeneous repertoire of tasks, which were afforded by the multiplicity and increasingly more sophisticated and demanding tools. Despite the promising and diverse outcomes, in second and foreign language learning contexts, limited attention has been given to Augmented Reality (AR) and its integration in intercultural telecollaboration.

The Benefits and Implementation of Augmented Reality Applications in Education

Augmented Reality leverages increasingly more complex and advanced hardware and software to merge real-world content and virtual data, which helps enact interactive, immersive and engaging visual experiences for users. As Carmigniani, Furht, Anisetti, Ceravolo, Diamani and Ivkovic (2011) postulate, “AR enhances the user’s perception of and interaction with the real world” (p. 342). Apart from STEM subjects, where AR has been deployed more recently, some attention has been placed on language learning (see Bacca, et al, 2014 for a systematic review of research in the field). Godwin-Jones (2016) succinctly notes that “Through its ability to use add-on digital assets to explore and expand scenes and locales from the real world, there is an obvious connection between AR and current theories of second language acquisition which emphasize localized, contextual learning and meaningful connections to the real world” (p. 9). Dunleavy, Dede and Mitchell (2009) postulate that AR has the capacity “to create immersive hybrid environments that combine digital and physical objects, thereby facilitating the development of processing skills such as critical thinking, problem solving, and communication through interdependent collaborative exercises” (p. 20).

In second and foreign language contexts, AR can offer a path to expand the boundaries of traditional teaching by transcending the boundaries of engagement, interaction and participating and adding virtual objects to the learners’ physical environment. Kessler (2018) indicates that AR will continue to facilitate “contextualized, motivating, and collaborative learning experiences in which learners use – and enjoy using – the language while simultaneously developing sociopragmatic and intercultural competence” (p. 212).

Multiple studies have indicated that AR activities can contribute to enhancing performance and developing a positive approach toward AR activities, experiencing learning through game-like activities, visualizing and exploring abstract and complex constructs, developing an in-depth understanding of instructional material and enhancing student motivation (see Barreira, Bessa, Pereira, Adão, Peres & Magalhães, 2012; Ibáñez & Delgado-Kloos, 2018; Kessler, 2018). In second/foreign language teaching, students enhanced their Spanish pragmatics through game-driven activities while solving a murder in Albuquerque, New Mexico (Holden & Sykes, 2011). Using ARIS, Holden and Sykes (2011) developed a mystery where students were invited to “solve the prohibition-era murder of Dionisio Silve in order to clear their family’s name and absolve the family of any guilt” (p. 6). Students were offered opportunities to practise the target language, Spanish, while interacting with fictional characters that could help them solve the mystery. Cervi-Wilson and Brick (2018) report on the integration of *Imparapp* to engage low intermediate level learners of Italian in an imaginary mystery where they are invited during a pilot play-test to travel back in time to experience Coventry during the Roman Empire.

Ho, Hsieh, Sun and Chen (2017) implemented Augmented Reality in a Ubiquitous Learning Instruction System (UL-IAR) for Android smartphones, where integrated learning strategies, along with quizzes, were used to examine their role on users’ learning performance and “whether cognitive styles and learning strategies affect learning performance when using UL-IAR” (p. 184). Ho et al (2017) conclude that UL-IAR facilitates learning of the target language, English, in actual real-life settings which enhances learners’ level of understanding of vocabulary and learning experiences. Further, as Ho et al (2017) demonstrate, accommodating language learners’ cognitive styles, can result in different performance in implementing UL-IAR. Liu and Tsai (2013) developed AR-mediated material that generated visual descriptions, such as descriptions of buildings, when the five participants pointed at specific directions through the use of their cell phones. Their goal was to examine the role of AR-mediated mobile applications in guiding English as a foreign-language learners in composing English essays. Liu and Tsai (2013) concluded that “participants were engaged in the learning scenario, constructed linguistic and content knowledge, and produced meaningful essays” (p. E4). These studies have generated some insightful and promising findings in the role of Augmented Reality in expanding the ecology of second and foreign language contexts and enacting opportunities for more enlivened and immersive learning experiences where the actual environment and virtual context intertwine to motivate and cognitively engage learners in this learning process.

However, there is still a gap in AR-driven activities that are designed using design-based research, are embedded in real-world teaching practices and guide in dealing with emerging challenges in second/foreign language teaching. In this study, particular attention was placed on the design of the AR-mediated applications that could enact affordances for intercultural telecollaboration, engagement, and were in alignment with students’ learning needs and their academic curricula. At the same time, the conviction was that the applications should be enacted on real-world participation in teaching practices which could also be perceived as *experiential learning* (see Barab, Tuzun, & Thomas, 2005). That is, the application drew on everyday practices that emerge in dealing with common teaching challenges encountered by the vast majority of teachers once they start teaching and students’ reflection on this challenge. The aim was to integrate into the curricula joint lectures, tasks,

intercultural exchanges and enrich students' learning with AR-driven activities that could enact affordances for *experiential*, real-world learning.

Methods

Research Design

First design-based research was adopted in the design and development of an AR application that was galvanised by real-life practices, as they unfold in actual teaching contexts. The aim was to examine the impact of these newly developed AR applications in promoting practices that inform and reinforce the teaching practice in meaningful and productive ways (see Barab, Tuzun & Thomas, 2005; Brown, 1992; Collins, 1992). The underlying mechanisms driving the design of the AR application were the development of game-like experiences where the elements of play, exploration, challenge and tensions emerging in actual teaching contexts could be implemented to design a real-world classroom environment with its everyday contradictions and teaching practices. AR is the culturally-driven artifact that mediates these classroom-based practices and enacts affordances for critical thinking and reflection on what the most appropriate path of action should be in order to overcome such practical challenges.

Second, to develop a better understanding on how the newly developed AR application, accompanied by task-driven activities, enacted affordances for contemplating and reflecting on effective techniques in dealing with disruptive behavior, students' reflections on the ReDesign platform were examined.

Data Collection

The data on the ReDesign platform included students' written responses and reflections in addressing effectively disruptive student behavior. Reflection offers a path to "make new sense of the situations of uncertainty or uniqueness" (Schon, 1983, p. 61). Reflection can emerge during the actual teaching practice or as a practice promoted during college education or participation in higher education contexts. In this paper, emphasis is placed on the latter in order to examine behavioral management, which has formed the subject of many studies (see Yost & Mosca, 2003; Yoon-Joo & Shin, 2009). However, in this study reflection on behavioral management is mediated by Augmented Reality and a Learning Management System during intercultural exchanges.

Data Collection Procedures

The written data were collected and analyzed using qualitative measures of analysis. More precisely, students' written responses on the ReDesign platform were analyzed to understand the role of goal-oriented activities, which were accompanied by the AR-driven applications, in enacting affordances during intercultural telecollaboration, to engage in productive, thought-provoking discussions and reflections on techniques in dealing with disruptive student behavior.

Participants

During the spring semester of 2019, nine first-year college students pursuing a teaching degree at a public academic institution in Cyprus and six of their peers enrolled in a professional development course in Teaching Chinese as a Second Language (TCSL) in an academic institution in a county in East Riding of Yorkshire participated in this study. There were seven female and two male students in the academic institution in Cyprus and six Chinese female students in the UK academic institution. Students were mainly exposed to traditional teaching methods but were eager to experiment with

novel tools and examine the prospect of their implementation in second and foreign language learning. None of the students had previously engaged with AR technologies in other courses. All students had smartphones and/or other portable devices. Students had an opportunity to experiment with smartphones and use QR codes to access course material, presentations and other related information for this course.

Before launching these intercultural exchanges, an interdisciplinary pool of scholars across Europe comprised of an educational technologist, three Information Technologists, an adept teacher trainer, four university-level faculty and a research fellow joined forces to design a Learning Management Platform, the ReDesign platform, and a series of AR-mediated activities that would form an integral part of their curricula and promote constructive strategies in dealing with disruptive student behavior.

The Design of the Disruptive Student AR-driven Application

Drawing on principles of design-based research, this AR application built on real-world teaching practice in dealing with an emerging challenge that most educators encounter in their teaching practice. The aim was to design an AR application that would inform practice and engage future teaching practitioners in the complexities and contradictions of the actual teaching practice in meaningful and constructive ways. The AR application provided an engaging context to stipulate conditions for participation, cognitive engagement and critical thinking on effective strategies for classroom management. It could also be argued that it offered a path to students to envision themselves as professionals who need to make critical classroom management decisions. It also promoted a better understanding of the available options and their implications in dealing with disruptive behavior.

In this case, three options were designed to invite participants in dealing with students' use of cell phones during class instruction. First, a classroom was created in AR simulating a traditional classroom environment in AR which featured the following objects:

- five characters (a female teacher and four male students)
- a blackboard
- a whiteboard featuring the project's logo, ReDesign
- four student desks and a teacher desk
- four blue backpacks
- a Ziploc bag
- a cell phone
- fourteen interactive buttons
- six-user interface featuring information on the screen such as guidelines on how to start navigating through this AR application

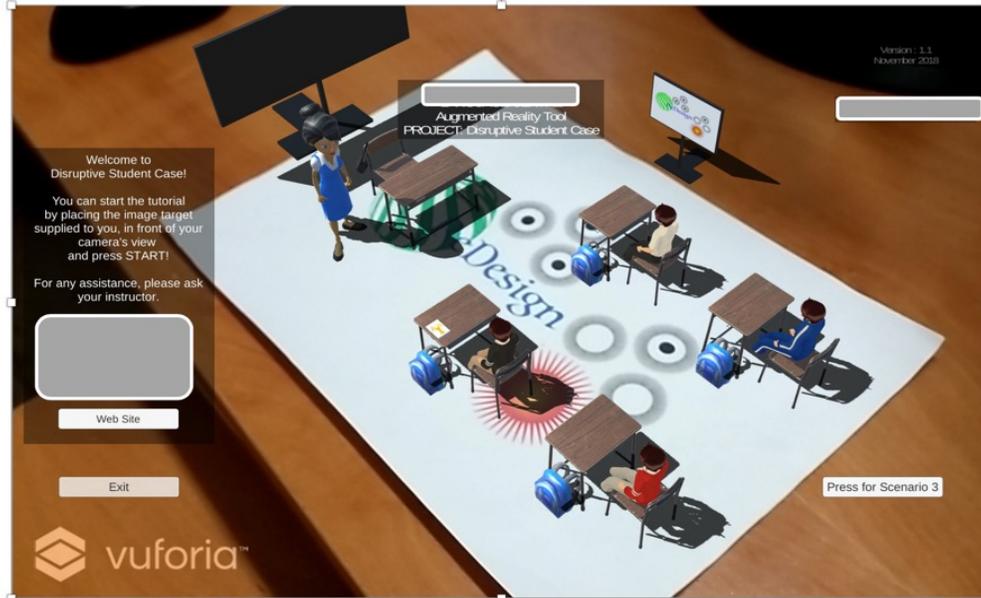


Figure 1: Third AR-mediated scenario of the disruptive student application

To enact more interactive and engaging AR-mediated environments that would become a vehicle for considering different options in classroom management techniques, the AR scenario was enriched with three different options and dialogue between a disruptive student and a teacher. It featured a female teacher delivering her lesson in class, and suddenly a student’s cell phone rings and he picks it up. Students were invited to identify the best possible way in dealing with cell-phone use in the classroom. In Fig. 1, the third option in dealing with disruptive student behavior is demonstrated.

First Approach:

T: Welcome to this exciting learning module.

S: [The phone rings in class and the student picks it up]

T: Interesting conversation isn’t it? No, you are alright.
Do carry on. You probably won’t pass this module.

Second Approach:

S: [The phone rings in class and the student picks it up]
Hey, what’s up?

T: Hmm...[the teacher turns around and ignores the student]

Third Approach:

S: [The phone rings in class and the student picks it up]

T: Would you hang up the phone and place it away?

S: [The student hangs up the phone and apologizes (text)]

T: [Grabs the phone and places it in a Ziploc bag on her desk].

The Implementation of the AR Scenarios

Multiple tasks and activities formed part of these intercultural exchanges; however, due to space limitations particular emphasis is placed on the AR activities. In the spring of 2019, all planned activities were successfully realised, so students in both academic institutions collectively explored the potential of AR during intercultural exchanges. This application placed emphasis on culturally appropriate classroom behavior, culturally responsive pedagogy and student engagement (see Table 1.). That is, the focus was placed on *experiential*, real-world teaching challenges. The tasks were placed on a newly developed Learning Management System, ReDesign, that was designed to feature multiple tools of social networking sites, such as Facebook and could be implemented across the participating academic institutions. As demonstrated in Fig. 2, some of its tools accessible to the participating instructors included *Posts*, *Attachments*, *Lectures*, *Assignments*, *Groups*, and *Students*.

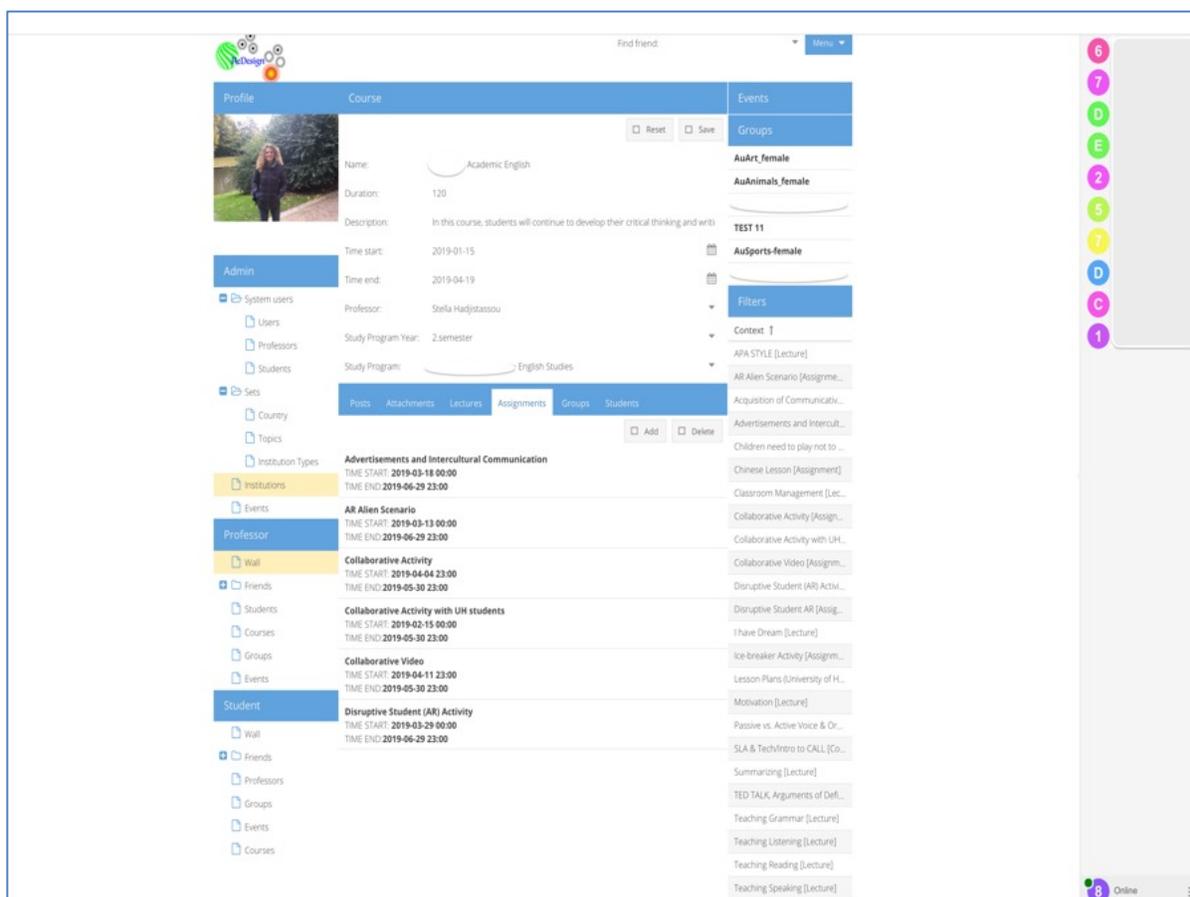


Figure 2: The newly designed ReDesign platform

Under *Assignments*, a set of collaborative tasks and activities were included. For example, the task listed in Table 1 below was included which was then posted and shared on the students' *Wall*. In return, students could post and share their prompts on their *Wall*. All participating instructors and students could view and respond to these postings. Specific guidelines, links and a handout, with the target image, were provided to all students in class and about fifteen minutes were allocated to guide students in exploring the different features of this AR application.

Table 1: Tasks implemented during the Spring semester of 2019

AR Application:	Task
Disruptive student application	Multiple strategies have been developed for dealing with disruptive students in a classroom context. In this AR app, three different scenarios are portrayed in dealing with disruptive students. Based on your cultural background, how appropriate or acceptable is to be disruptive in class? What is appropriate behavior in a classroom context? On the other hand, how do you deal with students that don't speak at all in class? What kind of activities would you implement to encourage student engagement?

Within a few seconds after introducing this AR application, a handful of students eagerly deployed their mobile devices to project the interactive AR application on the target image, zooming in on the teacher, four students, the classroom environment and artifacts projected in this AR classroom context. Even though the AR application featured specific written guidelines on how to start and navigate through the three different approaches in dealing with a disruptive student, some students struggled with identifying pressing interactive virtual buttons in order to proceed with the following two scenarios. However, some of their peers freely interacted with the interactive buttons, swiftly discovering and exploring the three approaches projected by the AR application.

Data Analysis and Results

In total, for this particular AR task, there were 15 written responses ranging from 23 lines to just one response reaching only two lines. In the case of Chinese as a second language teachers, four participants noted that they perceived classroom misbehavior as conduct or actions that inhibited the flow of classroom instruction. Any behavior that did not interfere with the flow of classroom instruction or procedure was acceptable. As Sun notes, "As long as it is not a serious impact on the class order, does not affect the normal progress of the lecture or other people to learn, other disruptive behavior I can accept [it]." Yun even perceived that some disruptive behavior could enact a more live classroom environment and time should be allocated for discussions and questions (lines 1-2). Heterogenous groups and questions to boost confidence are some of the steps that Yun proposes. Interestingly, Yun also acknowledges that she teaches Chinese as a second language courses and discusses some of the strategies that she implements to encourage students to speak in class, i.e., through a performance step. However, Yun is deterred by multiple disruptive students when organizing and delivering activities.

- (1) **Yun:**
- 1 Some naughty students can liven up the classroom atmosphere. Give
 - 2 students time to discuss freely. At that time, they are free to discuss
 - 3 and ask questions. But they can't discuss problems not relevant to the
 - 4 course and can't walk around. I will ask questions that match their
 - 5 level and help them build confidence step by step. Group shy students
 - 6 with talkative students. Using the power of the peers. I can use some
 - 7 lovely draw lots software. Suitable for the students' personal character.
 - 8 In my CI course, my student is not good at Chinese speaking. So I often
 - set a performance step to encourage my student to speak. If there are a
 - lot of naughty students, I will not organize a lot of activities to move....

There is a sharp contrast with what Chinese students perceive as behavior that can potentially enact affordances for lightening up the classroom atmosphere and promoting free discussions and what Greek-Cypriot students perceive as distracting behavior. Six out of the nine Greek-Cypriot students made explicit references to their cultural context and students' misconduct in class. Unlike Chinese contexts, in a typical Greek-Cypriot classroom context, as Emmelia succinctly describes, teachers experience instances of stress, lack of concentration, defiance and disrespect (excerpt 2, lines 1-4). Teachers waste invaluable classroom time to implement effective classroom management techniques (lines 4-6). Unlike their Chinese counterparts, Greek-Cypriot students appear to value silence during individual and collaborative tasks and adherence to classroom rules and procedures. They also identify the lack or limited student preparation as a hindering mechanism during in-class activities.

- (2) **Emmelia:** 1 Sometimes there is a disruption in the classroom. Students are anxious
2 and do not concentrate on the lesson. This situation is often presented
3 in schools in Cyprus, as there are in many cases students who
4 overlook their teachers and are behaving badly towards them. This
5 behavior influences the consistency of the lesson as the teacher wastes
6 time from teaching to calm this kind of students. On the contrary, a
7 proper classroom behavior is for students to work silently in their
8 team and individual tasks. Furthermore, students obey their teacher
and respect him or her. Students do not chat with other students and
there are rules in the classroom that they should follow or at least try
to.

Kirk explicitly acknowledges the use of cell phones in class and notes that disruptive behavior is so entrenched in the Greek-Cypriot culture and students are accustomed to teachers' intervention strategies or simply decide to ignore classroom misconduct, so he concludes that it is culturally acceptable to misbehave in class (lines 1-9). As Kirk argues, college-level instructors simply avoid implementing any classroom management strategies to stop classroom misconduct.

- (3) **Kirk:** 1 For example, they talk to their classmates , or they talk on the phone
2 while the professor is doing the lesson. I think that although in
3 primary and high school , teachers are more severe and make
4 observations [criticism] to children when they have an inappropriate
5 behavior , often tend to ignore some inappropriate behavior. Also , if
6 you go to a university...you will understand that although professors
7 want to have students with appropriate behavior, when they have
8 students with bad behavior I observed that they keep up with this
data [disruptive behavior] without trying to change the situations.
Those are the reasons that make me believe that in my culture it is
acceptable to have an inappropriate behavior finally.

Unlike some of the Greek-Cypriot students' culturally embedded practices emerging from everyday experiences and classroom misconduct, both Chinese and Greek-Cypriot students appear to identify similar strategies in engaging reserved students. Building self-confidence, a relaxed and secure classroom environment and engaging students either through questions, teamwork, or through the use of different tools are some common strategies that students across academic institutions discuss. For instance, in (3), Ruomei notes that she would raise questions, implement ice-breaker activities, promote competitive activities and offer incentives to galvanize students' interest (lines 5-7).

- (4) **Ruomei:**
- 1 If I meet a student who does not like to talk, I will give him some simple
 - 2 questions and try to let him answer them, so as to increase his self-
 - 3 confidence. What kind of activities would you implement to encourage
 - 4 student engagement? I think the first ice-breaking game is necessary to let
 - 5 people know each other better and ease the embarrassing atmosphere. At
 - 6 the same time, I also think that holding small competitions and setting
 - 7 certain incentives can also stimulate students' interest in participation, such
- as reviewing the content of this lesson by using games at the end of each lesson

Discussion of Results

This AR-mediated scenario constituted an effort to design an environment that could inform the teaching practice and engage future practitioners in meaningful and constructive ways. At the same time, it placed students in the teacher's shoes inviting them to reflect on the culturally-driven tensions emerging from disruptive student behavior. Therefore, the design of AR activities invited the use of this institutional context to address a significant classroom management problem: disruptive student behavior. In essence, it could be argued that it offered a path for *experiential learning* by bridging the gap between institutional knowledge and the actual teaching practice. At the same time, it enacted affordances for transnational exchanges, effective analysis and reflections on effective classroom management practices, frequent and often culturally anticipated and tolerated disruptive behavior from elementary school to college, constructive approaches and techniques in dealing with disruptive students and steps in creating a classroom environment to engage shy students. As Kolb (1984) and Barab et al (2005) advocate, action and reflection are integral elements of meaningful and constructive learning.

In the case of Greek-Cypriot students, students have not engaged in any teaching practicum but are consciously aware and experience in college disruptive student behavior and their professors' approaches in real-life situations. Consequently, this AR application is culturally relevant, and they acknowledge that, whether involving cell phone use, or engagement in discussions on irrelevant topics, loud exchanges, disruptive talk or other forms of disruptive behavior, these are everyday practices that are culturally ingrained and many professors in college consciously choose to ignore them. Greek-Cypriot students can directly relate to the three scenarios, anticipate such disruptive behavior and reflect on what they perceive the best possible course of action would be in overcoming classroom misconduct. The educational culture in Cyprus faces similar challenges in classroom misbehavior like academic institutions in the United States (see Ding, Li, Li, & Kulm, 2008) with

invaluable classroom time lost to implement classroom management techniques. This is probably one of the underlying reasons that Greek-Cypriot students' responses are passionate and pay emphasis to the local context.

In China, on the other hand, teachers are reportedly confronted with a different set of challenges in disruptive behavior including daydreaming, passiveness and inattentiveness. Chinese students are more reserved in raising questions since they believe that unintelligent questions waste invaluable classroom time (Ding et al, 2008). As result, Chinese students in this study appear to value some "naughty" student behavior, raising relevant questions about cooperation in class and passive misbehavior. However, they highlight the importance of the relevance of all questions to the instructional material. In contrast, the Greek Cypriot students seem to value silence. Both the Chinese and Greek Cypriot students propose a similar set of strategies for engaging students who do not speak in class, such as planning engaging activities, forming heterogeneous groups and other fun activities. In this case, shyness and avoidance in raising unintelligent questions in class are salient for Chinese students. This is in direct contrast to Cyprus, where students raise questions or solicit clarifications in class.

Pedagogical Implications and Conclusion

Drawing on design-based research principles, the design of AR application for intercultural telecollaboration has important pedagogical implications. First, educators can contemplate the cultural and pedagogical relevance of enacting such scenarios and their role in enriching students' learning experiences. At the same time, they can guide in the development of theory from practice and "inform practice and practitioners in meaningful ways" (Roth, 1998, p. xvii). As indicated in this study, AR can offer a new path to augment students' experiences through virtual objects, personas, sound-enhanced content and the enactment of real-life environments inspired by real-life classroom contexts. Students who have not participated in practicum experiences and have no teaching experience can envision themselves as teachers by experimenting with these AR-mediated scenarios and understanding that they have different options in dealing with both disruptive behavior and taciturn students. At the same time, students who have participated in teaching practicum experiences can view the different options in dealing effectively with disruptive behavior.

Second, AR scenarios can promote culturally-embedded reflections and insightful thinking into effective classroom management practices to eliminate disruptive behavior and engage reserved students. Drawing on everyday culturally-oriented practices, students can explore such scenarios to reflect on what they perceive as appropriate or inappropriate classroom behavior and their course of action in dealing with such behavior. At the same time, the scenarios can capture culturally valued practices in dealing with disruptive behavior. In the case of the Chinese students, it appears that they value student engagement, agency and initiation of questions as long as they are related to the instructional material. This behavior can enhance students' overall and productive participation and potential development. For the Greek-Cypriot students, on the other hand, silence and respect appear to be valued more. In the case of silent students, techniques to foster engagement and participation appear to be valued by both the Greek-Cypriot and Chinese students.

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