

Insider Spaces: Hands-on with XR in the Global Languages & Cultures Room

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Abstract

Adult learners benefit from a playful approach to learning (Whitton, 2018). Similarly, students experiencing immersive learning using virtual reality headsets can benefit from a playful and exploratory approach to language and culture learning (Arnold, 1979), which includes the opportunity to experiment and create content using accessible, code-free, and easy-to-adopt media and *Maker* techniques. This article proposes that this kind of content creation projects for students can result in an increased understanding and appreciation of the affordances of immersive technologies, especially when applied to cultural learning and second language acquisition.

In these projects, students produce outcomes by learning to work together, use tools, develop skills, and reflect on their place within the work, as artist-makers, as language learners, and as creators of culture. Learners are encouraged to reflect on their process of Making, and in doing so broaden that reflection to encompass ideas around culture and language, the essence of their creative process coming from conceptual inquiry as much as from the practical Making. We propose ways to adopt immersive technologies and use a dedicated Maker and creator space to facilitate effective innovative language and culture pedagogy—one that might better support learning through creative exploration.

KEYWORDS: MAKERSPACE, MAKER, VIRTUAL REALITY, PEDAGOGY, XR, AUGMENTED REALITY, CONSTRUCTIVISM, LANGUAGE, CULTURE, LEARNING, HIGHER EDUCATION, TECHNOLOGY ENHANCED LEARNING, BLENDED LEARNING, IMMERSIVE TECHNOLOGIES, TECHNOLOGY.

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Introduction

As new immersive virtual and augmented technologies designed primarily for the gaming and entertainment industry become more and more accessible, opportunities exist for academics and educators to adopt this technology into their teaching and research; and for students and learners to engage not only as viewers or spectators, but increasingly as content creators, assuming roles of designers and developers.

Immersive technologies can facilitate the exploration of the concepts of presence, empathy, point of view, and interaction. An immersive technology is one that blurs the boundary between the physical and virtual worlds, and enables users to experience a sense of immersion (Lee, Chung, & Lee, 2012). We may experience this in many ways; for example, virtual reality (VR) can be experienced using a head-mounted display (HMD), or in the case of augmented reality (AR) through a smartphone or tablet interface using a front-facing camera. However, we might even experience immersion using digital projection where a virtual or augmented world is projected onto a physical surface. We encounter these experiences in the games and entertainment industry, and increasingly in museums, galleries, and public spaces where audiences can interface with this technology.

For educators and practitioners working in the areas of language and culture, these technologies offer interesting new lines of inquiry and exploration with great potential for learning and research. This article explores the ways educators, approaching the delivery of their courses through a constructivist model (Piaget, 2006), can set immersive content creation projects for their students to leverage the affordances of immersive technologies for language learning and cultural study.

Conventional wisdom has long held that the best way to learn a language and its culture is through immersion in that culture. The already low degree of participation in study abroad (Gasta, 2018),¹ which has been exacerbated by the current public health context, means that many learning centers need to seek alternatives or ways to supplement those more traditional means of immersion. In a classroom-based setting, our attempts at immersion have been limited to activities such as speaking only the target language (TL) in class, reading literature in the TL, or joining language conversation groups. Students may also be learning alongside heritage speakers or live in language communities outside of their native origin, and these situations are challenging not only in terms of language acquisition but also in terms of cultural learning. They may also understand language learning from a multilingual viewpoint, and experience language through different social and political lenses. Immersive technologies, and the ability to explore them in design and Makerspaces, may help to

supplement or enhance these various contexts. Learning using this technology can be augmented by shifting emphasis from VR *spectator* (or player) to one of designer or *Maker*, where projects offer the opportunity to construct rich learning experiences using a combination of media skills and cultural learning. In this sense, it may also provide an opportunity to align with the communicative goals outlined in the *World readiness standards* (National Standards Collaborative Board, 2015), as well as the New London Group's (1996) (multi)literacy objectives, and engage with the symbolic dimension of language through the lens of narratives and storytelling (e.g., Kramsch, 2006).

It is easy to see how immersive technologies could relate to the principles of an immersive approach to language learning, and offer an effective and engaging way to experience language and culture. Previous work has provided numerous and diverse examples of using Google Earth VR to situate learners in a 3D landscape, and there are good examples of using this application to explore examples of commodified language or better understand city systems or uncover a colonialized past in street signs and buildings (see, for example, Leeman & Modan, 2009; Malinowski, Maxim, & Dubreil, 2020), such as those in cities throughout Singapore, India, or Haiti. Videos shot with 360° cameras can center you in a documentary, as a first-person witness to a story, situated within a film or image that reflects a particular place or culture. Examples include the *New York Times*' "Crossing cultures: Black K-pop fans in America" (Fineman & Jaffe, 2017) and "Artist at work: Carving woodblock prints In Brazil" (Shastri, 2017). As students become more familiar with the experience of seeing parts of the world through a headset or watching 360° documentaries, they may be interested in using the technology to make their own versions and gain a better understanding of the decision process of the filmmaker or designer, especially with regard to questions of community engagement, perspective-taking, or cultural understanding.

In this article, we will begin by showing how concepts researched across different areas can help to inform the use of XR in language and cultural learning. Then we will look at some of the reasons for a groundswell of activity in this area and the institutional context for this work. We will explore the work of the Global Languages & Cultures Room at Carnegie Mellon University (CMU), an example of a *Maker* and technology space conceived specifically for the exploration of immersive technologies in the teaching and learning of language and culture. We will see how projects—including a recent course—can help to facilitate this learning, and how instructors and students are leveraging the technology. Finally, we will explore the pedagogies of design thinking and media creation that are effective in this space, and suggest ways that educators could employ these in the delivery of similar subjects and themes.

Throughout, we will attempt to put the pedagogy ahead of the technology and emphasize the learning experience and course content. Of course, it may not always feel as if we are successfully achieving this aim when the technology is so prominently displayed, and its affordances emphasized, but it is an essential approach. I also want to state early on that there are many ways in which conventional media creation, or indeed many active learning activities, may facilitate similar or reciprocal outcomes, but we hope to show that the benefits of working in this way are positive and can provide many unique and valuable experiences for learners, opening lines of inquiry and engaging them in ways that they will not have previously encountered.

As a point of departure, our aim in the teaching of cultures and languages is to transform students into confident language users and culturally competent, engaged global citizens (Dubreil & Thorne, 2017). In promoting new hands-on Maker and technology spaces, we can perhaps foster multidisciplinary approaches to the study of language and culture. Through these technologies, students can develop skills in digital media creation that talk to their context, experience, and understanding of language and culture, and in turn, improve the world around them.

Blending Research on XR: Review of Existing Literature

Throughout this article, I will refer to the technologies of augmented reality (AR) and virtual reality (VR), which exist at either end of a mixed-reality continuum (Milgram, Takemura, Utsumi, & Kishino, 1994), as XR. This definition, which is used more and more within the academy, originates from the discipline of spatial computing (Greenwold, 2003), which seeks to understand the possibilities of adaptive design and the synergy between the user and how they interface with the technology (UI). In seeking a multidisciplinary approach to the use of immersive technologies for language and cultural learning, we find ourselves drawing from a variety of sources and building on work that exists within several fields, not only within computing, gaming, and arts but also within digital humanities and the arts.

The entertainment and games industries often recognize that developer and creator ask similar questions about the relationship between user and space, the method of accessing the technology, handheld screen, and wearable screen (headset), and that the tools to create content are often the same, for instance, 3D applications such as Unity, Blender, or those within the packaged Adobe Creative Cloud. Developers of XR consider their audiences in similar ways, creating experiences, temporal events, and interactions, and eliciting emotional responses and behaviors that overlap.

It is these emotional responses and behaviors that hold promise for educators, keen to engage and contextualize learning for their students. However, many questions remain. Ideas around empathy and presence are problematic. So, too, is the issue of cognitive load, where learners may simply be so overwhelmed by the visual and immersive aspects of an experience that there remains little room for learning. We must consider these factors, encourage learners to reflect, and give them a space to identify the sensations, emotions, and thoughts that they experience using XR. These technologies hold great promise for learners and educators, but we must adapt our teaching and empower our learners if we are to use XR in the teaching of language and culture.

While there are many studies of the use of XR in science subjects, there are relatively few in the area of language learning (Lan & Lin, 2015), and it is almost 20 years since the publication of Schwienhorst (2002), which found that VR was able to facilitate active learning within “intrinsic motivation, more intercultural awareness, and a reduction of the affective filter” (p. 11). The CALL community has explored tools and apps, shared best practices, and encouraged further adoption of XR within language learning, and studies have shown efficacy in terms of cultural learning and use in SLA. In *Best practices in the use of augmented and virtual reality technologies for SLA, design, implementation, and feedback* (Scrivner, Madewell, Buckley, & Perez, 2019), the authors report on a series of studies looking at student engagement with specific VR and AR apps, showing differing levels of engagement, but with much potential for language instruction where engagement and memory retention are the key elements for success (Carrió-Pastor, 2019).

The Institutional Context: A Space for Immersive Technologies

Many language resource centers and labs have evolved to better facilitate student projects and support instructors in the making of content for language and cultural learning, following the recommendations of the International Association of Language Learning and Technology (Kronenberg, 2017). Institutions have invested significant sums in new technologies for use in classrooms. The Global Languages & Cultures Room at Carnegie Mellon University (Pittsburgh, United States) is a purpose-built facility managed by the department of modern languages, which provides teaching (and research) space and a facility for those seeking to engage with immersive technologies and explore pedagogies for learning language and culture. Equipped with cutting-edge technology, it includes a selection of current HMDs that learners can use, and a dedicated immersive room with a projector array that displays panoramic

images to those in the space without the need for a headset. The room is designed to facilitate experiential learning in a flexible teaching space that can be reconfigured in several ways. It is a space for active learning through media creation and experiential activity.

Throughout the institution, there is a thriving Maker culture, exemplified by two key university-wide initiatives that strongly influenced the success of the room. The first of these is IDeATe, the Integrative Design, Arts, and Technology network, which offers a minor for students on a range of programs, supplementing skills learned elsewhere in engineering or computer science, but also increasingly in the humanities and social sciences. As in the Global Languages & Cultures Room, there is a desire to explore outcomes and outputs using technology to tackle concepts and ideas encountered in their other programs, in history, global studies, or second language learning. IDeATe has been phenomenally successful with students, courses are in high demand, and the resulting work is displayed and showcased annually. Students recognize the value of these courses, and many of the projects run in teams with minimal supervision but with clear and consistent guidance and support.

The second group within CMU that should be recognized is the Entertainment Technology Center (ETC). This two-year graduate program attracts students who may have completed animation, computer science, performing arts, music, filmmaking, graphics, or fine art courses (but not exclusively so), and provides a vigorous program that includes visual storytelling, building virtual worlds, drama improvisation, experience design, and multimedia production. With its industry-orientated (Pellegrino, Hilton, & NRC, 2012) or problem-orientated approaches—and instructors acting as executive producers or supervisors, working with clients and tackling live briefs—the energy and creativity on display are at times awe-inspiring, and the scale and complexity of student responses often surpass the expectations of all involved. The interest among humanities and arts students in this non-traditional tech, and in computing and engineering fields, has continued to rise, as students reflect on the value of these courses in terms of the skills that they are learning and the interesting ways that they can associate content from other areas of study.

The Global Languages & Cultures Room endeavors to inscribe itself in this ecosystem and has benefited from a close relationship with both these initiatives, taking inspiration and borrowing aspects of their ethos to launch new projects, including interactive films and virtual reality projects that relate to language learning and cultural study. It is clear to anyone encountering the room that Maker culture is greatly valued and is an approach and a philosophy that are reflected in the teaching and research and through the projects of its students.

Making and Creating in the Global Languages & Cultures Room

In this next section, we will explore new projects that typify the Maker approach in the Global Languages & Cultures Room. Although I also include aspects of other courses and projects, the examples primarily come from a course entitled “Multicultural Pittsburgh: A creative media exploration of community, language, and identity.” This course in language and cultural learning includes significant elements in the production of immersive experiences, media creation, and exploration of technology.

In the process of designing project briefs, we quickly realized that students would benefit from an introduction to *design thinking* (Cross, 2006) as a framework for their process. While some students had some familiarity with this way of working, many were new to the method of ideation, prototyping, testing, and iterating. Indeed, design thinking in the context of creating language and cultural projects may be unfamiliar to many working in this area. However, taking process as a point of departure and using it as a framework to shape a curriculum can provide students with recognizable staging posts and phases by which they can measure the progress of their projects. The cognitive and practical processes in design thinking are rooted in problem-solving and often begin with a question. Designers will research and learn to empathize with the client/audience (in our case—community), and often work to define a problem statement before moving to ideate, play, prototype, and test a range of solutions. Throughout the process, the relationship to the question or content material becomes more nuanced and complex, and designers will adapt and iterate on solutions, going through a process of simplifying or refining the project until it arrives at a conclusion. A media creation process may share similar phases, but it may be constrained by the need to always move forward, with a limited number of opportunities for iteration and testing; for instance, if there is a need to rewrite, reshoot, and re-edit. However, there are distinct pre-production, production, and post-production phases that can provide a similar framework for learning.

For our projects, situated within teaching through immersive technologies, design thinking helped us to understand the skills required for the sort of project-based learning that we wanted to engage with. These are skills that appear instinctively in younger (K-12) Maker culture (Campbell & Jane, 2010), but which may be occasionally lacking in older learners, who tend to be more solution-focused and unaccustomed to such a process. In a study recounted in “Design thinking and children” (Koh, Chai, Wong, & Hong, 2015), the researchers found that “the cognitive dimension of design-based learning was found to be intertwined with the metacognitive dimension,” and that pupils

benefited from a design-based learning approach to enhance “perceptions of a 21st-century learning experience” (section 4.4.1).

One of the ways that students can approach their projects is in the use of *wireframing* and *prototyping*. This is the concept of part-building a dummy version of the final outcome. Wireframing will lack the technical detail and functionality of the final project, but it will be sufficient for explaining and examining a proposed solution. Students may use online tools such as Adobe Photoshop, or even cardboard boxes, paper mock-ups, or modified versions of existing products. The point is the rapid development of something visual that can be examined and questioned, an agreed model that can be repeatedly referenced by all. In XR development, wireframing and prototyping tools help students to focus on ideas, audiences, and storytelling. In media creation, we can use storyboards and reference images that can be quickly assembled and drawn to talk through ideas and narratives. These processes aren’t just useful shortcuts, but reflect the expectation of the design, gaming, and creative industry as a way to develop new projects. Students learn to communicate stories quickly, using pen and paper, and assess ideas for their potential to engage audiences rather than be distracted by the technical skills required for Photoshop or Premiere Pro. This also enables them to focus on and foreground the language and culture elements of their story. Again, this may be challenging for students and sometimes at odds with their instincts; where they might focus on detail and precision, they are instead asked to work in a quick and *dirty* way, where efficiencies are gained later in the project once concepts have been agreed and signed off.

There are many new ideas that students encounter, and although it is unfair to say that they do not encounter these concepts in other subjects, we found that they were often new to applying approaches from one discipline to another.

Multicultural Pittsburgh: The City as a Mirror for Identity

In the course “Multicultural Pittsburgh,” students are asked to draw on their cultural identity to explore the city of Pittsburgh and capture the stories of its diverse and multilingual communities. Indeed, our students are with rare exception multilingual—most are bilingual but many are competent in a third or even fourth language. The course brings together international students and US-born students, black students, and students of color, sometimes drawing on their upbringing within Asian American, Indian American, African American, Indigenous, Hispanic and Latino, and Arab American heritage communities, and the multiple and interwoven identities in their families and neighborhoods. They live at the intersection of languages, moving between *lingua franca*, patois, creole, local dialects, and slang, mixing words and

blending conversations to suit the context, generation, and setting, and to amplify meaning. These students are in the process of forming their identities and understanding them as fluid, sometimes relating their experiences to those of others that they see similarly portrayed, eager to challenge assumptions or show solidarity. The course also draws students that do not speak second languages, who are white, American, and may identify as non-diverse; however, this is still a context, and an important one in the shaping of their identity, perspective, and understanding of the world.

The city offers a landscape through which we can explore diversity and recognize the many different languages, cultures, and perspectives that are situated here. We might say that the city offers a type of immersion, in a space that is moving and changing through time. This is our setting and offers a means for students to explore, interact, and consider their own identity and upbringing.

Teaching “Multicultural Pittsburgh”

This course has been taught multiple times and is currently in its third iteration. Each time, it has been adapted to improve the teaching of the different elements that make up its delivery. At its core, “Multicultural Pittsburgh” is a course in which students are asked to create an immersive experience, using 360° videos, to explore the (multi)cultural landscape of Pittsburgh. Consequently, the course is multidisciplinary and requires students to combine theory and practice in cultural competence and language learning with media creation skills and learning of VR technology.

Although some students may come with some prior knowledge of media creation, a design thinking approach, or an understanding of the complexity of cultural studies, they have often not been asked to put these to work at the same time toward creating one project. However, by using a design or Maker methodology that includes ideation and conception, writing and planning, in order to then put that plan into action and engage with storytelling elements to culminate in the creation of digital outcomes, students can link their learning to a scheduled timeline of staging posts or review points.

The first few weeks encourage students to explore the city and think about connections to their cultural context or identity. For instance, one student sought to engage with the Latino community and developed a particular interest in artists and writers with a similar background to hers. This student offered potential subjects at our weekly meeting, including a community group supporting Latino families; a restaurant and eatery; and a spoken word poet who would eventually become the subject of her film. While keeping a running diary of notes in a reflective journal, the student secured the participation of

the poet, meeting in the company of colleagues and proposing the idea of a VR 360° film. The poet, by her own admission, had not encountered this form of media before, so the student was able to use her learning to explain some of the affordances and peculiarities of shooting film in this way.

Another student, born and raised in the city, pursued her interest in understanding social issues, specifically food insecurity, by creating a film about an organization that redistributes surplus food from supermarkets and stores to food kitchens and families in need. This student spent a few days with the organization and, following their guidance, used their smartphone app to make several trips as a driver, the app matching her with a local store that had surplus food and arranging a drop-off at the organization's center. Over those few days, our student used the 360° camera to capture the journey from pick-up to redistribution. She talked with those within the organization and those receiving aid, using interviews and a first-person view to create an immersive documentary of the process.

As a third example, a student of Taiwanese descent talked to store owners with similar heritage backgrounds, before conducting a short interview and capturing scenes from inside a Taiwanese store. The student was able to build a relationship with the owner, sharing language, communicating the aims of the project, and working in a collaborative way to tell the story of the business and its customers.

These are just three of the many and varied class projects in which the students were able to gain trust and agreement from the subjects that they worked with. Some students said that the newness of the technology and its unfamiliarity often became a talking point or motivation to try it out. To a certain extent, students overcame their fears of venturing away from campus in order to engage with members of the community and create their films. We spoke a great deal about equity and collaboration, how other VR content creators, such as Al Jazeera's Contrast VR unit (<https://ajcontrast.com>), were able to create documentaries by working with communities, and how conversation and in some cases co-writing and co-filming had led to better storytelling.

All the films that resulted from the course were published via YouTube (<https://tinyurl.com/mcpcmu20>), allowing those with or without a headset to view and understand the aims of the project. As a class, we held a short film festival, inviting some of the subject participants to come into the room and view the finished pieces.

Reflecting on Learners' Experiences of Creating Virtual Reality 360° Videos

The Global Languages & Cultures Room has been supported through the Center for Academic Excellence, whose staff have advised and consulted on research-led teaching and reflective practice for those instructors teaching and using the facilities available. Students agreed that aspects of the course, including final outcomes, reflective journals, and surveys could be gathered and used to provide insight into the effectiveness of teaching within this setting. In this section, we share some of the comments from the students' writing, drawn from their blogs—with anonymized names and comments edited—to reflect on key points of learning from the first year of the course. The student data presented here are akin to a design process book and lend themselves to a qualitative approach. In this sense, it perhaps provides a more journalistic insight into the thoughts and reflections of our learners.

For many students, creating a VR 360° video provided several challenges. The procedure for creating this type of media mirrored those of conventional filmmaking and documentary video courses, for instance, in the following of a production process, from script to screen (albeit via headset here). As students became more familiar with the use of 360° video, in the watching and deconstruction of set-text films, they started to play with the technology, cameras, and audio recorders, and they learned about capturing footage, editing, and publishing.

As detailed earlier in the article, many students were new to a design thinking or media creation process and reflected on the experience of working in this way. Many commented that it was useful to first sketch out ideas on paper before opening software packages, and they appreciated the insight into ways of working reflected more in industry than in academia. As Catherine notes, the course provided an appreciation of the extent of the use of VR across many different disciplines.

Before this course, I did not think much of VR outside of the context of video games, which even then, I did not fully appreciate the capacity in which it serves a new level of entertainment and human experience. After this course, I have learned to appreciate the complexity and ground-breaking nature of the development of VR and the potential it holds in transforming the way humans experience and perceive things. I have become much more interested in using it as a medium as well as more interested in watching films creating using this and how VR can impact the film industry. (Catherine, "Multicultural Pittsburgh" student)

For many students, one of the most demanding tasks was finding suitable subject matter, the people and places that would form the centerpieces of their

films. For some, this meant leaving the confines of the campus, going out into the city, and introducing themselves to new people and getting to know them. The assumption that taking a camera to the streets and “shooting from the hip” might produce interesting results was quickly dismissed, and, as this next student reflected, knowing what to shoot and having a strategy for filming was of paramount importance.

Interviewing and reaching out to people is much harder than it seems. Preparation and research are key! Also, be patient ... it may take multiple visits! Planning, planning, planning! It might be annoying and stressful to get in the habit of doing pre-production and editing planning (I know myself, of all the videos I've made, this was the first time I did formal planning), but it's helpful for once you start filming and editing. Find a topic you're passionate about and have fun in the process! (Tim, student)

Tim's experience was typical of learners on this course, nurturing relationships with their subjects, finding a way to reach out into the city, equipped only with research and a 360° camera. The “Maker culture” is particularly evident in this context, implicit in the discussions students carried out with their subjects and in knowing they were going to create something together. They knew that their success would be judged on how well they told their story, and how well this collaboration worked in the service of each other's intent.

Choosing VR as a medium for storytelling has its advantages in that “scenes” are essentially shot in one continuous take, without the need to adjust for framing. A close-up only occurs if the subject leans into the lens; otherwise, all shots are similarly covered. Conventional filmmakers “shoot for the edit,” that is to say, they need to think about how the footage will cut together, so use a variety of shot sizes (wide, medium, close-up). But for 360° filmmakers, where the camera is capturing everything in a single wide-angle image, the most important decision is where to position the camera within the environment, in order to provide the viewer with a realistic and clear point of view.

This point of view is decidedly humanist, and comes from an understanding of person and place. To this end, the course forced students to engage with the surroundings in a different way than many had done so before, leading to new and different experiences:

My relationship with (the city) has improved, especially given my continuous positive experiences/interactions with the people/communities within this city and the truly diverse set of cultures and areas I have been able to learn more about in and out of this class and have grown to appreciate and admire. (Katie, student)

Although I have been here my whole life, (my view) certainly has changed for the better. I am more aware of what (this city) is doing to embrace its cultural diversity

and alleviate issues of injustice. I did not know about many of these organizations and their missions. I have gained immense respect for nonprofits in the area and I am now interning for one over the summer. I feel like if more cities and communities adopted similar organizations, the world could be a much better place. I am very inspired by what I now see going on around me. (Laila, student)

These quotations highlight that it was not only the technology that impacted the students' experiences, but also that the subjects they encountered and the stories they were able to tell left lasting impressions. Many reflected that they might explore their future surroundings in similar ways, reaching out beyond their work and home life into the communities around them, and often that they felt more confident in their abilities to interact and explore their environments.

Returning to the classroom, students reflected on their first encounters, and the distance traveled and the value gained throughout their projects. Many remembered being amazed by the magic of the medium, but then made leaps into more critical spheres, thinking about the implications for the technology and our relationship as a user, viewer, and Maker:

My VR experience in the room was very. Very. Visually stimulating. BUT the visual stimulation cannot cover up what's blatantly lacking: stimulation in all other senses, perhaps except sound. I could walk through the streets of Tokyo as much as I want with VR Google Earth, but I will never be able to get the smells, touches, and tastes with it. There is a certain aspect of "being there" as opposed to just seeing with your eyes. Not to mention, everything in VR Google Earth is just so ... still. No movement of cars. No movement of people. No stuffy, humid summer heat. Tokyo is not Tokyo without the real experience of bustling streets and overcrowded air condition-less trains. (Tyler, student)

The students above share a deep understanding of the relationship between technology, the process of storytelling, and their subject matter both positively and insightfully. They were able to draw connections between the different elements and apply aspects of critical thinking to their projects. As humanities students, they are learning to equip themselves with the tools to discuss the implications of the technology critically, examine the ways this new technology is impacting on creators and users, but also on the representation of subject matter and the stories of the different communities we encountered. In this way, all the pieces reflected the students' interests in exploring aspects of their cultural identity, and provided a means to reflect on their relationship with culture and express their thoughts and feelings.

Lesson Learned: Onboarding with Virtual Reality

Working with immersive technologies is new for most people, as well as for our classrooms. This next section provides some guidance for educators who may be interested in exploring XR in their teaching and learning. There are a great many technical considerations, and some educators will benefit from support and guidance, but our aim again is to think about how XR activities can be facilitated, and how simple tasks such as putting on a headset can provide rich opportunities for discussion and learning.

Technology has always provided opportunities to explore new activities and has encouraged instructors to adapt existing pedagogies in new ways. For instance, the questions of whether the use of VR should be treated as a stand-alone experience for an individual, or whether such technologies can be adopted and used for a full class, or alternatively form part of a classroom activity for remote (online) delivery all remain open. Teachers also borrow from established activities, such as asking the student to watch a VR documentary using an HMD and following up with them at the next session through a group discussion or critique.

Many VR activities are often carried out in pairs, with the viewer in the headset relating the experience to their partner, who notes keywords or scribes the verbal thoughts as the viewer expresses them. The aim is to manage and alleviate cognitive load, which increases more generally when students need to use their hands and gaze around to solve puzzles or engage in sorting exercises (Hashimura, Hiromitsu, & Yusuke, 2018). It may be difficult for the partner to assist with tasks when viewing the attached computer monitor, as they do not share the same spatial understanding as to the headset wearer, although they can join in by taking notes on their partner's behalf. They can offer some assistance throughout, handing the controllers to the viewer (and catching them before they're dropped on the floor). This process of onboarding is crucial to the learning experience. Wearers benefit from a short introduction when handing out a headset with guidance as to how to put it on so that you don't get tangled up, what to do if you're wearing glasses, where the buttons are on the controllers before you load up an experience. Some of these elements are intuitive, and wearers who have played console games may be familiar with controllers and UI, but again, this may be the first time some have encountered an HMD designed for games and entertainment. At the end of an experience, there is also a moment when viewers remove a headset and there is that feeling of adjustment familiar to a cinema-goer's experience when the lights come up. The wearer emerges, slightly disorientated, as if from a dream or similar reverie.

All these moments provide an opportunity for reflection, and learners should be allowed to comment and discuss each aspect. They relate not only to the new sensations we encounter in using technology, but to our relationships with space, our bodies, and ways of seeing. There is a relationship, too, with who we are, how bodies are treated in different cultures, or by gender, age, and disability. Learners who can critically analyze this technology through different perspectives will be able to apply this insight to the creation and development of new projects.

Discussion and Observation

As the means to consume and create XR become more accessible, students can more readily play, explore, and make. Through the experiences, games, podcasts, and presentations that they create, as well as the briefs and assignments that they engage with, learners can identify storytelling as a discursive and cultural artifact that can be leveraged for language and cultural learning.

The work of the Global Languages & Cultures Room takes place in a space that brings together technology and the humanities. There is a tension here that should be recognized; the aim is not to put the technology first or evangelize the possibilities, but rather to use the opportunity to explore, engage, and construct new ways of learning. Students in the “Multicultural Pittsburgh” class engaged in playful learning and Maker culture to explore assumptions around the nature of language and cultural learning. They were able to move through immersive spaces, with a rich sensory sense of presence within the content, whether cultural or linguistic. When Riva (2007) talks about “embodied cognition,” he is recognizing a “feeling of being in a world that exists outside the self.” As we work with our students through the projects and listen to the reflection they provide, many speak not of a visual but often of a full-body experience that produces a sensory spatial effect, which one often encounters in media creation or performance, but which equally is found in Makerspace learning, art, or craft.

Pedagogies for Cultural and Language Learning through XR Creation

The dominant pedagogies of the learning activities in the room are rooted in theories of constructivism, where students not only bring their knowledge to their learning, but also tap into communal constructivism by engaging with others’ knowledge. This approach has been shown to work well within simulated 3D environments similar to a full VR experience (Chau et al., 2013).

We suggest that the most effective way to implement this approach is through project-based learning (Behizadeh, 2014), as we show in this section.

It is important to make the distinction that this course aims to bring many different elements together. Where others have used XR to teach languages (Mills, Courtney, Dede, Dressen, & Gant, in press) or explore cultures using VR documentaries, the aims here are for students to become Makers of their *own* content. Many technologies are first incorporated by teachers rather than students, for instance, in the use of podcasting, where students might make a recording to share with learners or capture a video that can be played in class. However, in this course, the emphasis is on students as creators.

Again, it is important to reflect on some of the finer details of working in this purpose-built space on XR projects that explore language and culture. For instance, early on in the course, we state that technology will be used only when it is *needed*. We have observed less reliance on laptops or phones than in other classes. Rather than have these devices out all the time, students only use them when they're required for a quick online search or to work on an online document. "It's nice to see each other eye-to-eye, so many times it's just a sea of laptops," noted one student, which is a reflection that for many in lecture halls, consistent laptop use can be alienating, often detrimental to learning, even a barrier to relationships formed through learning. Setting up a learning space with the boardroom layout or design table—with paper and pens for the creation process—affords connection, meaning, and interpersonal communication in ways that are not seen in typical lecture-based classes. These small changes provide recurrent gains, and it is interesting how quickly new habits form and expectations change. For example, one week the instructor forgot to lay out the paper and bring the pen pots to the table, so one of the students took it upon themselves. When students arrive at the door and see paper and pens, they immediately understand that they will be active participants in the learning. When students arrive in a room where all the tables and chairs face forward toward a lectern, they know that often they will be passive listeners, perhaps invited to ask a question, not of each other but of the instructor, who is the true center of the classroom.

Developing a Transdisciplinary Approach

We recognize that teaching in the Global Languages & Cultures Room requires not just a *multidisciplinary* approach, but one that is *trans-disciplinary*. We ask the student to identify and develop skills that are typically associated with other disciplines, including design thinking, rapid prototyping, development, creative, and artistic skills. However, where in the past we would ensure that a group of students drew from a cross-section of these skills, a *transdisciplinary*

student needs to develop these skills as an individual, knowing which to invoke at a given moment and, crucially, to understand the relationship between each and the actualization that comes from combining and merging talents, skills, knowledge, and understanding to ensure a successful project.

While these learners might grasp the benefit of working in this way, they find it extremely challenging to first identify these skills and second, to understand how they need to be leveraged within project work. There may be a variety of reasons for this. Students are often encouraged to identify strengths, which, when conflated by erroneous “learning styles,” form a particularly narrow view of their learning. The narratives that form can be difficult to shift.

For many who attend our sessions, the difference in modality is sometimes difficult to adjust to. Students often need reassurance that the first time doing anything is always difficult or even quite often results in failure, and that repetition, rebuilding, working iteratively, refining and testing results will yield improvement and development. Seth Godin reminds us that “the person who fails the most wins” (Entis, 2015). This can be difficult for those students who strive for early perfection, as they may sometimes blame the modality for their struggles. Students are taught to reflect on their work and learn techniques for providing feedback to others, providing constructive criticism and plenty of encouragement. A typical class may have trained them to only care about the grade, rather than the process that gets them to the outcome. In this sense, this kind of Maker project class has the potential to change the way we educate, and the way the students learn.

Project outcomes are designed to demonstrate key concepts and elements inherent within their design, supported by documentation of process and reflective journals that attempt to capture the thinking behind decisions that the student must take along their way. In other subjects, students may be used to testing each skill independently, but in these projects, the final outcome is designed in a way that demonstrates the accumulation of these skills.

As students develop their Making skills through the communication of ideas and the aspects of design they need to develop in order to manage their content, they act as facilitators and Makers, but also as subject specialists in their disciplines, whether this be language, culture, history, or other subject-specific areas. Ultimately, this breakdown of roles or “swapping of hats” (Massey, 2005) resulted in a raised awareness and appreciation of the different skills required to fulfill the brief.

It may be that thinking in the humanities demands critical distance, handling increasingly complex problems, and for many learners their engagement comes from understanding how much of what they learn they can apply to an understanding of today’s world. Tech leaders decry the lack of humanities graduates even more, who are needed to tackle misinformation, understand

the impact of innovation on society, culture, language, history, and identity. We must encourage students in the humanities to recognize how crucial their input can be to the future of science and technology, and why it is important to convince companies and leaders in these fields to recruit them.

As instructors, we worked to find ways to avoid technical bottlenecks, often using pre-built templates, incorporating consumer-level technology, or bringing in expertise from elsewhere. This enables instructors to find teachable moments rather than spend their time tackling the traps and hurdles that might lead to students being delayed, sidetracked, or simply bogged down by the technology. This support is key; pedagogies should be shared and an open approach to learning, whereby projects can be shared, adapted, and remixed accordingly, are sure to lead to an increase in adoption.

However, the overall aim was not to use the technology for replication (as in the early steps of the SAMR model² (Pfaffe & Annunziato, 2017; Puentedura, 2015) or to enact lower-order thinking as per Bloom's taxonomy (Anderson, Bloom, & Krathwohl, 2001), but to make something new that provided a new perspective and would be inspired by the student's own experiences and relationship with the content material. This often led to difficulty with a grading scheme, since dealing with content that reflects identity and culture is often a highly personal and subjective experience. Some students asked for exemplars, or attempted to avoid personal context, speaking more generally of nationality or describing general cultural traits. As instructors, while willing to provide guidance, we wanted to avoid putting up barriers to the imagination, as it is sometimes the case that students react to an exemplar by making only slight adjustments, producing a counterfeit or facsimile of the original.

Looking to the Future

The course that we have developed, "Multicultural Pittsburgh," and the projects that we have put forward aim to encourage a trans-disciplinary and humanistic approach to the use of new technologies, such as VR. Toward the end of the semester, students spoke of their appreciation for different approaches to learning and to exploring subject matter, the need for diversity of content, and the value of recognizing themselves as Makers and authors (Hafner, 2015).

We hope that students will not only leave with an appreciation for the use of XR as a technology of the future, but also ensure that they contribute to a better understanding of how it can be used to explore language and culture. There are so many aspects of learning in this way, as outlined above, that it can be challenging to place them in order of importance. For some students, it may be that the use of design thinking as a process for exploring themes in humanities will be something they can replicate elsewhere, or that they will continue

to express themselves through Maker and creator projects that force them to work in a transdisciplinary way. For some learners, the greatest take-aways have been personal, as they have sought to learn more about their relationship with culture and language. Some have strengthened ties to communities and continued to address the social issues at the heart of their projects. One student on the course completed an internship and adjusted her pathways, so that she could continue to address social policy and community work, focusing on food insecurity. Each student completed the course reflecting on a slightly different aspect to that of their colleagues, and in many cases actively pursuing this aspect in the next phase of their learning. Through their writing and reflection, they were able to identify the different skills and themes that they encountered and recognize their areas of strength and those of development.

Coming back to the students for a final time, we reflect on their journey using the room and participating in this course. We have worked to develop their digital literacy, connect the classroom to the real world, and center themselves in the learning as they explore aspects of their own cultural identities. For many, their experience will result in new ways of working and approaching subjects. At the heart of the course is an understanding that different perspectives can inform our understanding of the world around us. In a course that blends new technology with learning about culture and language, and inspires you to make and create your own outcome and express yourself in this way, you will need to consider many perspectives and approaches that you may be encountering for the first time. There is a future for language and cultural learning that is skills-based, that leverages the affordances of a project-based approach, and that supports students through creating and Making.

As we approach the third year of the Global Languages & Cultures Room, we are looking forward to future projects. In the next phase, we hope to expand the Maker capacity within our area and look forward to a redesign of our resource center, an opportunity presented by a physical move for the department into a new space. We will continue with workshops and talks, sharing best practices, and opening the way for educators to bring aspects of Maker culture into their curriculum.

Note

1. Gasta is using data from the Institute of International Education to suggest a modest increase. However as a percentage of students studying languages in US programs, participation in study abroad is very low. (For the statistics themselves, see Institute of International Education, 2020.)
2. The SAMR model is a framework developed by Dr. Ruben Puentedura to assist educational institutions in adopting and integrating new instructional

technologies into the curriculum and instructional practices. The four levels of the model are (1) Substitution (new tools allow to do the same tasks as in the previous environment); (2) Augmentation (technology affords more efficient ways to perform common tasks); (3) Modification (new technologies are substituted to old ones and potentially leads to task redesign); and (4) Redefinition (technology adoption leads to the creation of new tasks). The first two stages are understood to be mere enhancement of the educational environment. The last two are more transformative.

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