

MIXED-REALITY IN LANGUAGE ACQUISITION AND ITS
EFFECT ON SOCIAL DISTANCE

by

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A THESIS

Presented to the Department of Linguistics
and the Robert D. Clark Honors College
in partial fulfillment of the requirements for the degree of
Bachelor of Arts

May 2022

An Abstract of the Thesis of

Nicolas Vassilenko for the degree of Bachelor of Arts
in the Department of Linguistics to be taken June 2022

Title: Mixed-Reality in Language Acquisition and Its Effect on Social Distance

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Creating genuine human connections, especially in one's non-native language, relies heavily on knowing the cultural and social rules of the target language (Roever, 2017). One way to address and learn these differences is through second language (L2) pragmatics (i.e., how speakers express and interpret meaning). Despite the critical need for pragmatics in the language classroom, it is often ignored (Taguchi, 2012). However, emerging frameworks enable practical and scalable classroom implementation in meaningful and transparent ways.

This thesis explores one such approach. In doing so, it describes insights from a pilot implementation of a mixed-reality experience (MRE) designed for the learning of second language pragmatics. Specifically, it discusses the implementation in light of four critical affordances of MREs for learning - (1) superseding social structures and hierarchies, (2) integration of supportive frames and schema, (3) leveraging multimodalities, and (4) facilitating immediate and possible futures – and its effect on understanding the principle of social distance.

Acknowledgments

I would like to profusely thank Professors Dr. Julie Sykes, Dr. Ian F. McNeely, and Stephanie Knight M.A. for giving me the courage to take on the monumental task of a thesis. Without their service on my Thesis Committee, this would not be possible.

I would also like to thank my family and friends for always believing in me when I thought I could not achieve this.

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Introduction

Connections between one another are a foundational piece of the human experience. Creating genuine human connections, especially in one's non-native language, relies heavily on knowing the cultural and social rules of the target language (Roever, 2017). One way to address and learn these differences is through second language (L2) pragmatics (i.e., how speakers express and interpret meaning). More specifically, pragmatics is defined as “meaning as communicated by a speaker (or writer) and interpreted by a listener (or reader) and [to be able to interpret] people's intended meanings, their assumptions, their purposes, or goals...” (Yule, 1996, 3-4). While the field of pragmatics is broad (Sykes, 2018; Taguchi, 2017; Wardhaugh and Fuller, 2021), operationalizing pragmatic ability as related to language teaching and learning is essential. At the macro level, there are four fundamental pragmatic dimensions - politeness, or politeness orientation, (i.e., of the preferred group-oriented or individually oriented strategies used in language). Group-oriented strategies are used to express solidarity, interdependence, and affiliation. In comparison, individual-oriented strategies are used to maintain the speaker's individuality and freedom of action. Power refers to the control and decision-making authority that one has in a relationship between two interlocutors. There are three categories that interlocutors will typically fall into in day-to-day interactions: equal or neutral power (e.g., such as with a friend or a colleague), more power (e.g., being that the individual is a boss or instructor over people), and less power (e.g., an employee or a student). Social distance refers to how well the interlocutors know one another (see section 2.1). Finally, rank of imposition refers to the severity or degree of challenge in a language function (e.g., a

high rank of imposition is required to ask for a considerable favor, such as borrowing money in certain languages). These four fundamental pragmatic dimensions guide key interactional patterns across various languages. This project focuses on social distance (i.e., how close, or not close, the interlocutors perceive their relationship) as one of these critical dimensions. As explored further in section 2.1, the social distance between interlocutors is reflected through the language choices speakers make (e.g., a generic greeting with an acquaintance as compared to a specific greeting with someone you know well) and how a listener interprets those choices (e.g., a certain level of indirectness might signal distance to a speaker of Spanish).

Despite the critical need for pragmatics in the language classroom, it is often ignored (Taguchi, 2012). However, emerging frameworks have the capacity and potential to enable practical and scalable classroom implementation in meaningful and transparent ways. Sykes, Malone, Forrest, and Sağdıç (2019) describe four pillars as follows:

Knowledge is the ability to know what words, grammar, and semantic elements to use. Analysis is the ability to understand the impact of these words and make the correct selections for the situation. Subjectivity is the ability to consciously describe why the language patterns were chosen. Awareness is the ability to scan other people's reactions to the chosen words and adjust accordingly if so desired. These four pillars are foundational to operationalizing the teaching and learning of pragmatics in the target language and can serve to frame learning outcomes and assessment needs.

In addition to new frameworks, emerging technological tools (e.g., digital games and simulations) also benefit pragmatic instruction. AR, VR, and other CALL

(computer-assisted language learning) devices have seen remarkable success in recent years (Godwin-Jones, R., 2016; Castellano, 2016; Xie et al., 2019; Alfadil, 2020) by implementing known mediums that students use, such as social media or video games, creates a prospect for a more engaged classroom. Although, game-based learning is not new to the realm of education. It offers opportunities for active learning, problem-solving, creativity, self-regulation, personalized learning, and fun social interaction (Bober, 2010, Veach, 2019). As seen below, each of these is critical to the game discussed in this project.

Games, more specifically mixed-reality experiences (MREs), facilitate immersive storytelling, objective-based education, and digital literacy. As an example of immersive storytelling, Xie et al.'s (2019) use of VR tools in a foreign language class of high-level Mandarin Chinese class provided an authentic, real-life setting for the students to navigate. The activity flipped traditional instruction by having students become tour guides of each area that the class explored. This allows students to engage in active learning, creativity, and a personalized learning experience because they themselves control how to “run” the tour. The study concluded that students had improved their presentational skills, pronunciation, and creative writing skills in their L2, showcasing the effectiveness of personalized, innovative learning experiences.

These properties that are shown by Xie et al. (2019) showcase the pinnacle aspects of the MRE. Having an innovative and engaging learning experience has the capacity to strengthen L2 pragmatic acquisition. In addition, being able to navigate digital spaces is becoming fundamental in modern-day society.

Castellano (2016) emphasizes confidence in the contemporary social media environment. Through an Advanced Media English course, designed to develop further skills that students have learned in the second year of Media English, students learned the importance of media knowledge whilst also learning English. Objective-based, each lesson has a visual, achievable goal to obtain, having the outcome of a viewable material they had created. The study concluded that switching from media content consumers to content producers had a positive confidence transfer to media used and multimodal fluency. This developed the students' sense of the modern social web, which allowed for more meaningful participation. MREs reflect the findings by implementing multimodalities to learn communication skills across different platforms. Emphasizing that having the skills to both consume content and create content is essential for learning digital fluency. Another facet of MREs is the AR implementation as described by Godwin-Jones (2016). This study demonstrates the potential for independent play and classroom application.

Godwin-Jones (2016) argues that location-based AR games are a pinnacle of pragmatic learning. Godwin-Jones evaluates Holden & Sykes's (2011) AR game, designed to teach Spanish pragmatics to ACTFL intermediate-level learners (ACTFL Proficiency Standards). The gameplay combined classroom activities, independent play, and specific site visitation. Having the narrative of murder mystery in the prohibition-era enamors the player to complete the story while also practicing and learning Spanish pragmatics. Results showcase the immense potential in a mixed media experience, where not only possessing an engaging learning experience but acquiring beneficial social and pragmatic information.

Learning with a game, rather than from a game, is where the true potential of the MRE emerges (Reinhardt, 2019). Specifically, this thesis explores the potential of MREs to extend our understanding of L2 pragmatics, games and play, and the integration of digital and analog materials in learning. In doing so, it will draw on the social distance component of a pilot implementation of an MRE designed to facilitate L2 pragmatic development. The sections that follow address the ways in which this implementation reflected Daradics, Knight, & Sykes' (2022) critical dimensions of learning via MREs - (1) superseding social structures and hierarchies, (2) integration of supportive frames and schema, (3) leveraging multimodalities, and (4) facilitating immediate and possible futures.

2. Foundational Concepts

2.1 Social Distance and L2 Pragmatics

Within the L2 classroom, there is a strong focus on the ability to speak (Brown, 2016). At the macro-level, speaking is a fraction of mastering an L2 (e.g., reading, writing, speaking). However, pragmatics, as a critical component of interaction, is largely ignored (Dorado Escribano, 2019; Danaei et al., 2020). As stated in Section 1, pragmatics comprises four macro-level fundamental dimensions that are critical to interpersonal communication. One of which is social distance, which plays a vital role in creating personal connections. Out of the four macro-level fundamental pragmatic dimensions skills, social distance is the subject matter that focuses on the perceived relationship, or ‘closeness,’ between the interlocutors.

Social distance is the skill that deals with relationships and the ‘closeness’ that is felt between each other (Boguñá et al., 2004; Sykes, 2018). Learning how social distance impacts language use and interpretation are essential for making solid and meaningful connections. Another contextual factor impacting the scale of perceived like-mindedness or similarity of behavioral disposition between a speaker and addressee. For instance, they derive from similar backgrounds, acquaintance(s), or personal characteristics – like gender. It is the feeling of ‘closeness’ with someone in a verbal relationship, and this ‘closeness’ impacts how an individual would speak and relate with others (Castellano, 2016). For example, a language learner may use distance maximizing strategies to show deference when the situation calls for a more immediate topic at play. Therefore, context and social situation largely contribute to the topic’s perceived appropriateness. As learners develop second language skills, it becomes

increasingly important to expand one's repertoire to create these conditions across differences. Besides background connections, contextual elements play apart in social distance.

For example, greetings and small talk in day-to-day life and the ways language might vary between family or friends compared with an acquaintance or coworker. The speaker may discuss overarching aspects of the family members - such as workplace, personal traits, or age. Whereas individuals with a deeper connection, such as a close friend, are considerably more likely to discuss more intimate details. They could be the genuine struggles occurring and more personal stories with intimate details. This element of social distance is an example of a more Standard American English scenario. In some languages, such as German or Italian (Dressler & Barbaresi, 2011), a speaker would not mention family with a coworker because that is the pragmatic norm. Concurrently, this might be essential for constructing workplace trust in some other language communities. The variance among these languages, especially when not discussed, can be a significant challenge for new learners, which inevitably derails attempts at forming interpersonal relationships. While seemingly simple in definition, there are intricacies within a social distance (Roever, 2017), which are the social deixis.

Another example of how social distance is encoded in a language is that of social deixis. Social deixis deals with the word choice or 'coding' of the social status of the addressed – for instance: 'your majesty, boss, etc.' (Manning, 2001). There are three main components within social deixis: person, place, and time. Depending on social subjectivity, social deixis will appear depending on the ranking of the individuals.

More often than not, classrooms emphasize social distance by placing phrases and habits - such as formality and using singular pronouns like 'sir' or 'ma'am.' This is because singular pronouns are meant to show a sign of respect further and not to use an individual's name in these contexts, resulting in a placed distance in the relationship (Helfgott et al., 2008). While conversations may vary, textbooks used in the classroom emphasize distance creation strategies to convey further respect for the autonomy of the listener. By not having proper conversational language used by expert speakers, a student will not have the chance to experiment with relationship forming.

A potentially effective way to address this social distance and language in the classroom is by having students directly engage with various patterns across communities and pragmatic preferences. As will be seen in the following section, MREs offer unique affordances to address this variability.

2.2 What is an MRE?

Mixed-Reality Experiences (MREs) bring together three technological tools, augmented reality (AR) and virtual reality (VR), and analog materials (Daradics, Knight, and Sykes, 2021) to create playful learning simulations and games. Augmented reality use is derived from smart devices - such as tablets or cell phones - that scan QR codes to 'pop-up' images or videos. Initially, AR and VR were used for entertainment purposes but have recently been showcased within the teaching world. Such as by Danaei et al., (2020), the immersion in reading L2 children's books is heightened by having voiced pop-ups and animated characters. AR also saw a significant boom in popularity in 2016 with the introduction of the mobile game Pokémon GO. Having players catch as many Pokémon as possible – upwards of five hundred as of 2021 – but

making the gameplay entirely based on walking to catch Pokémon enticed exploration and exercise (Godwin-Jones, 2016).

MREs use a similar function in that the physical world is used to have students be immersed in the context of the correct learning environments while also using an analog element to ground the learner. In these play-oriented and immersive experiences, participants will complete collaborative, multi-step simulations to unpack critical knowledge related to targeted pragmatic functions (Sykes & Knight, 2020). Play-oriented learning environments help motivate collaboration, a definitive aspect of the MRE experience. Emphasizing collaborative skills helps bring awareness to the pragmatic abilities being explored. MREs capitalize on these game-play mechanics and experiences to research essential information in the target language's functions. They use analog media (such as physical world puzzles involving moving pieces and correct placement of items) and digital media (where augmented reality comes into effect). By giving examples of vastly different social distance preferences outside of their existing cultural frame, learners will find MREs to heighten social distance comprehension by providing tangible examples without fearing the consequence of a wrong interpretation. MRE and learning social distance patterns allow the space for trial and error.

Virtual Reality is the digital medium of using an optical device that attaches to the user's head to immerse them into a new world. This process has primarily been used for entertainment, but it has sparked interest in other fields with its rise in popularity. For example, it is seen as a teaching tool in the classroom, military training, and exploration of things outside of reach (Alfadil, 2020). Recent use within the classroom setting comes from Xie et al., 2019, wherein students used VR in a high-level Mandarin

Chinese classroom to place students on the streets of China to function as virtual tour guides to their classmates. Xie et al.'s article relates to MREs by focusing classroom activities on student-led explorative learning.

2.3 Pilot Implementation - Welcome to Byru'Moxia

To further inform the conceptual ideas presented here, the research team engaged in a pilot implementation of one MRE - Welcome to Byru'Moxia - specifically focused on the macrolevel dimensions of L2 pragmatics.

Welcome to Byru'Moxia entails a combination of analog and digital assets that participants must use to complete an escape room-type simulation. To launch the experience, participants view a short video that introduces them as space explorers who have crash-landed on the planet Byru'Moxia. Their mission is to escape the planet by finding four power crystals related to one of the four mentioned macro-level dimensions of pragmatics (i.e., politeness, power, solidarity, and rank of imposition). On the planet of Byru'Moxia, participants will meet the Byrumoxi aliens, each of which has different preferences around language use (the non-human oriented condition). The participants must solve the four puzzles within the allotted time to escape the planet (forty-five minutes). This game experience allows participants to complete collaborative, multi-step simulations to unpack critical knowledge related to targeted pragmatic functions (Sykes & Knight, 2020). Specifically, they must figure out speaker and listener preferences and make language choices that are appropriate for the context.

For the pilot implementation discussed here, eighty-six participants (undergraduate and graduate students) engaged in the experience via zoom video conference and breakout rooms. Each was training to be a multilingual ambassador for

the summer 2022 World Track-and-Field championships. All the ambassadors spoke more than one language. For this reason, the MRE environment seemed like a superb setting for these individuals. Further details on how the pilot implementation was done and initial observations of this pilot implementation are explored further in detail within Section 3.

3. MREs and Learning Pragmatics

The early development of computer-assisted language learning (CALL) has had a significant impact on the use of virtual reality (VR) and augmented reality (AR) in the classroom. Current materials that include VR/AR technology have had impactful results on L2 learning capabilities such as reading, writing, speaking, and listening (Gordon-Jones, 2016; Pan et al., 2017; Xie et al., 2019; Aldeguer & Akombo, 2019). A way in which these learning capabilities are being taught is through the popular entertainment medium of the escape room. Escape rooms are created around a theme (e.g., on a pirate ship, spy heist) designed to challenge participants by having them solve puzzles in an allotted time of usually sixty minutes. Popularized in Kyoto, Japan, in 2007, these group-oriented activities have seen worldwide enjoyment. The MRE utilizes this known gameplay type of an escape room within this pilot implementation.

The challenge with using MREs is that, beyond anecdotal evidence, there is not a keen sense of what happens in escape rooms regarding how play and collaboration manifest themselves (Pan et al., 2017). MREs have limited research about how they can be used for L2 pragmatics, with this being the first project to systematically examine ways in which MREs can be used to help learners develop key pragmatic skills related to each of the target pragmatic macro-dimensions of politeness, power, social distance, and rank of imposition.

Fortunately, elements that have been used within the intervention – digital discourse, internet connectivity, augmented reality/virtual reality – have been researched more extensively in the last few years (Debabi & Bensebaa, 2016; Goodwin-Jones, R., 2016; Xie et al., 2019). Education can vastly benefit from the medium of

games. The main praise of MREs is the practical skills learned. By ‘gamifying’ learning, individuals are more likely to stay focused and retain the information presented (Debabi & Bensebaa, 2016). Previous studies have shown significant data supporting the inclusion of AR within the classroom (Danaei et al., 2020; Alfadil, 2020; Xie et al., 2019). This is partly due to its quantifiable effect on retained vocabulary, story retelling, and immersion (Danaei et al., 2020; Alfadil, 2020; Xie et al., 2019). In addition to this, several studies (Goodwin-Jones, R., 2016; Pan et al., 2017; Aldeguer & Akombo, 2019; Dorado Escribano, 2019; Cruz, 2019) stress the fundamental skills that not only help within the classroom but in their lives are acquired through MRE’s implemented technology; communicative, decision making, and team building to name a few (Pan et al., 2017; Aldeguer & Akombo, 2019; Dorado Escribano, 2019).

With this research in mind, this thesis will explore how mixed reality can be used to learn how social distance is expressed across languages. Participation in mixed-reality experience puzzles that focus on social distance can impact participants’ expression and interpretation of social distance.

MREs have the capacity to immerse students within a new social context and structure while simultaneously creating conditions under which pragmatic skills are fundamental for success. For example, the MRE that is the focus here requires participants to utilize essential pragmatic skills directly tied to the aforementioned pragmatic dimensions of politeness, power, social distance, and rank of imposition in order to recover four power crystals and fix the broken spaceship. This is done by understanding the Byrumoxi community and their social deixis ‘coding.’ All information is gathered using Captain Everlight’s journal (see section 2.2 for more

details on the MRE). In doing so, the experience draws on four fundamental affordances of MREs to contribute to learning - (1) superseding social structures and hierarchies, (2) integration of supportive frames and schema, (3) leveraging multimodalities, and (4) facilitating immediate and possible futures (Daradics, Knight, and Sykes, 2022). The sections that follow explore each in detail.

3.1 Superseding Social Structures and Hierarchies

Undoubtedly, the world around us affects the way we act and behave. We have come to expect, and rely on, the stability and predictability that the structure affords (Herik, 2020). However, being engrossed in these environments can conceal ignored aspects of the situation - ideologies, hierarchies, and social structures - that influence actions (Ennsner-Kananen, 2016). Such consequences emerge as being uncooperative amongst peers, lack of communication, and disassociated image due to status (Ennsner-Kananen, 2016). From this viewpoint, MREs intend to bypass archetypal social structures and hierarchies by purposeful vagueness in information and for the means of individual and collective cooperation (Daradics, Knight, Sykes, 2021). Non-human-oriented conditions (Byrumoxi) layered with ambiguous details allow for an aspect of curiosity to inspire epistemological exploration, even though discomfort is caused by uncertainty. They create a space for exploration without fear of negative consequences (Thorne, Black, and Sykes, 2009). Social structure and hierarchy are underspecified resources in combination with the lack of knowledge about making headway, which motivates collaboration to gather information from the domain—resulting in the participants' current structure and hierarchies being bypassed, suspended, and/or altered for a narrative play and experience building.

The resources within the MRE are purposefully lacking in contextual information. Thus, hypothesis tests and critical analysis are required to understand the new social structure presented. In combination with the lack of knowledge about how to make headway, having underspecified resources motivates collaboration to gather information from the domain (Sykes, 2018; Harren, 2020; Alfadil, 2020) with the intended result of the participants' current structure and hierarchies being bypassed, suspended, and/or altered for the purpose of a narrative play and experience building.

In addition to the gameplay itself, the MRE content requires participants to uncover the fictional hierarchy established by the Byrumoxi. As can be seen in Figure 1 below the participants were shown the power structure of each of the six Byrumoxi. They were then asked to utilize this information to make decisions about language use.

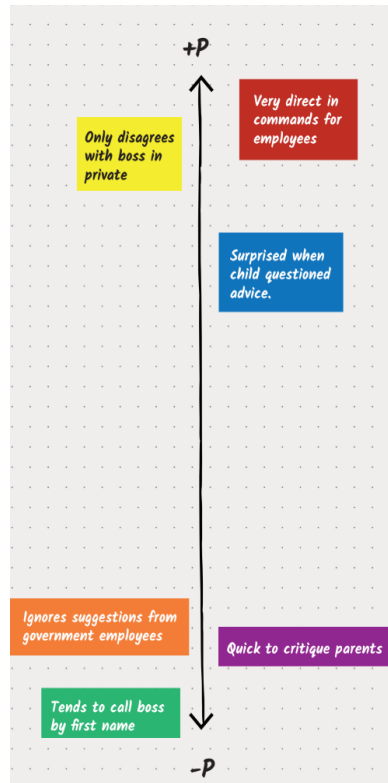


Figure 1: Social structure and hierarchy

Each different group of Byrumoxi (represented by a distinct color) has an associated profile that the participants use to inform themselves about the civilization's social structure and hierarchies. Social distance and its representation are vital to understanding the Byrumoxi community and their social deixis 'coding.' All information is gathered using Captain Everlight's journal. Furthermore, through hypothesis and critical thinking, participants must uncover and determine the social structure and hierarchies in the fictional world without being explicitly told. For example, Figure 2 (see below) shows that the red Byrumoxi is the 'Chief Commander of Intersellarlocutor Station' (parallel to a high-ranking person in power). Preferring clear organizational roles (i.e., Red Byrumoxi being in charge) and those who are

employees (i.e., Green Byrumoxi) should follow this established hierarchy. Because of Green's use of direct questioning (see Figure 6) of the station's mission (see Figure 2) comes across as off-putting to the Red Byrumoxi. Participants must draw conclusions from each of the different Byrumoxi social media pages about their hierarchical preferences to uncover and understand the community's power dynamic (hierarchy) (see Figure 1). Participants experience a structured unfamiliarity and an unpredictability with the intention of undergoing minor frustration. This is done on purpose and is a desired element for the environment of the MRE to attempt at the activation of the social engagement system of the nervous system to stimulate the prosocial behavior of collaboration and openness (Wagner, 2016; Daradics, Knight & Sykes, 2022).

What was observed in the pilot implementation was that participants engaged with the social media pages intently to glean key information. The familiarity with the layout of social media platforms is inviting, sparking curiosity and exploration. Moreover, they were able to gain insight into how power impacted social distance. Participants would generally know what is displayed on a social media page, but not the details themselves. Which is the unfamiliar aspect of the puzzle. Posts differ between each Byrumoxi to show how each person's preferences impacts their own language use. As such, in addition to solving the puzzle, learners gain key skills for examining pragmatic patterns and apply them in any language they are learning.

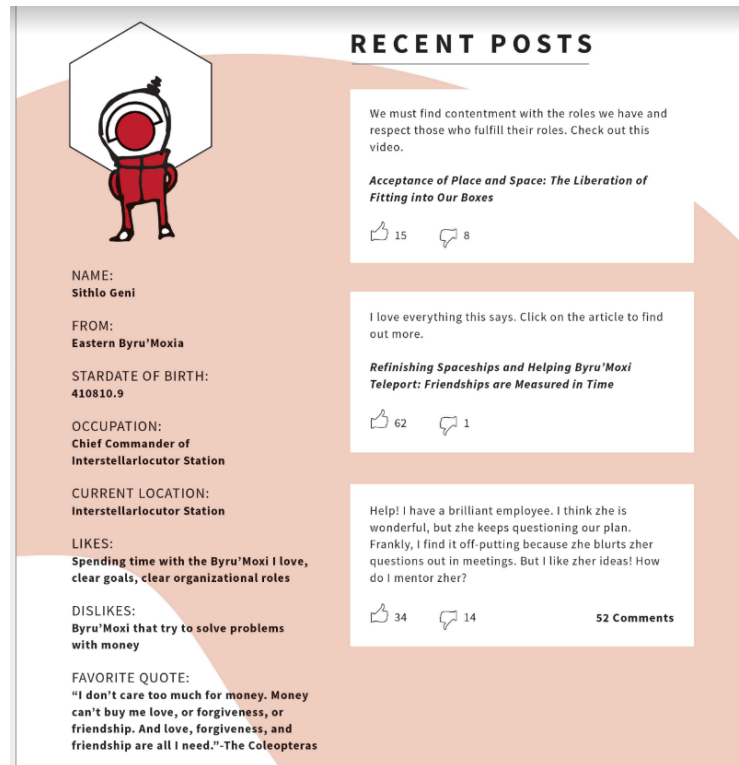


Figure 2: Red Byrumoxi social media page

3.2 Integrating Supportive Frames and Schema

MREs simulate the universal under specification of life itself (see superseding social structure) by crafting an intricate frame (i.e., the narrative of space, see Figure 3) and implementing a set of schemas (the games/puzzles) designed to facilitate learning. These supportive frames and schema are the housing of the MRE activity and frame the contextual decisions learners make. This strategy intends to make a situation where participants are aware that the gameplay contexts are contrived and not at all like their day-to-day lives. The frame is the catalyst to recalibrate expectations allowing for an alternative perception and interactional behaviors to shift awareness (Daradics, Knight & Sykes, 2022). Crafted frames have the intention of allowing participants to perceive an alternative perception and interaction behaviors to move sense awareness. The

schema in the context of an MRE is the games (puzzles) themselves. Each puzzle is designed to have various rules and stipulations attached that facilitate complex, open-ended, and emergent interactions by shaping participation and linking material, information, and experience.

Based on these commonalities, MRE's construction implements the frames with schema (Daradics, Knight & Sykes, 2022). The frame within this context is the narrative of deep space. This was purposefully chosen to create a narrative that would be familiar to the participants but used in a novel way.. Therefore, the schema is built around this narrative of unknown deep space by having games/puzzles that incorporate a theme of space and science fiction (e.g., alien interaction, ship cockpit, power crystals - see Figures 2, 3, 4, and 6).

The engineered frame represents the social distance to simulate what it would be like to experience an unfamiliar environment without prior knowledge. Only being able to comprehend once delving in without fear of mistakes will inevitably happen (Sykes & Reinhardt, 2013). What was seen in the pilot implementation was that participants took risks in developing hypotheses around the story's narrative. Moreover, this willingness observably increased as learners became more familiar with the task at hand. Having an environment that allowed for interpretation - because it was an unknown context - seemingly allowed for genuine engagement.

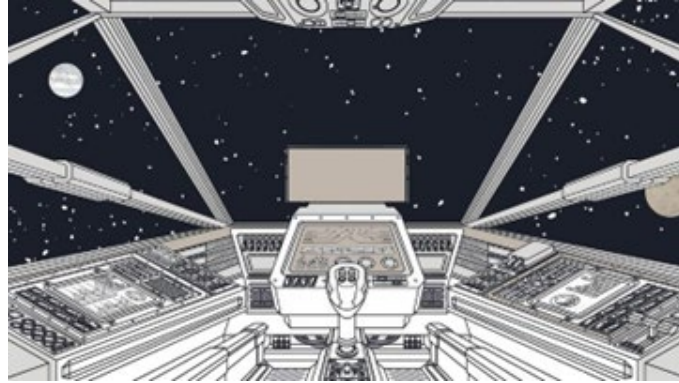


Figure 3: Spaceship's Cockpit

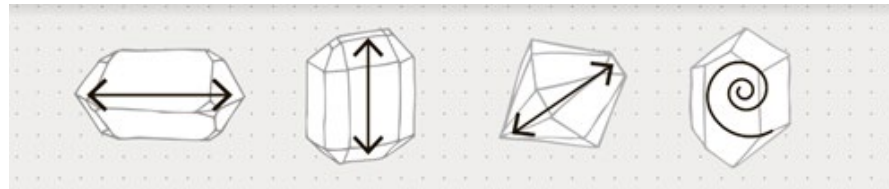


Figure 4: Power Crystals

3.3 Leveraging Multimodalities

Multimodalities are the aspects of speech and writing modes with clear affordances, treating them as means of communication. These modes are socially shaped communication shaped by the community's needs (Kress, 2015). Each community, therefore, has differing senses of value in the modality. Kress (2015) gives the example of in the semiotic world, those who do not have sight, sound, and the ability to hear will have a completely different position of importance in that population than in a community that does have sight. Multimodalities have the capacity to bridge semiotic differences between communities or the “semiotic gaps” (Kress, 2015; Saeed & Arfan Lodhi, 2020); in other words, symbolic communication through signs, logos, and other nonlinguistic communication methods. This is further emphasized by the

ubiquitous nature of social media and the connectedness of the modern-day (Kress, 2015; Saeed & Arfan Lodhi, 2020).

The evolution of communicative means - internet, social media, texting- and their forms are dependent on communities and individuals. Because communities and individuals are the agents of meaning to unfamiliar words, meaning is derived from various communicative modes. (Kress, 2015; Daradics, Knight, & Sykes, 2022). MREs include multimodal inputs to showcase how communication is evolving to support practices required for language learning. Using varied digital media modes, the MRE promotes a heuristic approach to learning about multimodalities by allowing students to discover and determine how each Byrumoxi communicates digitally and verbally (Daradics, Knight, & Sykes, 2022).

This is vital for MREs to simulate non-aligning communicative expectations with participants (Daradics, Knight, & Sykes, 2022). Multimodalities within MREs, therefore, are designed as diverse tasks that encourage a multitude of cognitive practices that stimulate engagement: building explanations and interpretations, observing, and describing, making connections, wondering, and questioning, considering other views, evidence-based reasoning, uncovering complexity, and forming conclusions (Ritchhart and Church, 2020). By design, it allows the opportunity for participants to take part in analog elements and applications, resulting in a feeling of an authentic, real-world experience (Daradics, Knight, & Sykes, 2022). As such, MREs employ multimodal inputs to mirror how communication is evolving. For instance, in diverse digital media, the expectations of forms are vastly dissimilar to those of analog media (hand-written letters). Digital media would allow the use of specific slang and abbreviations (“sus”

and “lol”) because of the mode (Sykes, 2018). Defined as “ciberpramatics” by Yus (2010), it is the pragmatic conduct in a digital space. The behaviors in an online context are foundationally important for L2 learners. These rich environments are essential for language learners to pragmatically explore and experiment to develop L2 pragmatic fluency (Sykes, 2018).

Social distance, therefore, is affected by multimodality or the mode in which the interlocutors communicate. This is because context dictates the appropriate social distance that is expected. Understanding the relevant strategies depending on the context, phrases, and terms differ in the positive or negative social distance (e.g., when drafting emails to coworkers versus speaking in person). Multimodality is modeled within the MRE in the form of blog posts made by Byrumoxi citizens. Through the gameplay elements, multimodality is simulated by audio transcriptions and faux digital media posts. Each mode challenges participants to discover how different Byrumoxi citizen communities speak and their preferences to be communicated. Multimodality is simulated by audio transcriptions and faux digital media posts. Each mode challenges participants to discover how different Byrumoxi citizen communities speak and their preferences to be communicated to. Figure 5 below is an excerpt from Captain Everlight’s journal - the analog element of the MRE - and where participants gather the information necessary to complete puzzles. Using the given social media profiles within the journal, participants will determine the correct response to each distinct Byrumoxi. This puzzle implements an element of each of the pillars of pragmatics (Power, multimodality, rank of imposition, and social distance).

MESSAGE FROM GROUND CONTROL:

CREW, WE BELIEVE THE LAST SHIP THAT CRASHED HERE TRIED TO REVEAL A HINT ABOUT HOW TO UNDERSTAND LANGUAGE WITH THEIR FLIGHT PATTERN. HOWEVER, THE LOGS ARE SCRAMBLED IN THE ICC. WE THINK THAT THIS WAS A SECURITY MEASURE.

EACH QUARTER OF THE FLIGHT LOG HAS A QUESTION TO PROVIDE A PASSWORD TO UNLOCK THE FLIGHT PATTERN. WE THINK THAT CORRECT ANSWERS WILL SHOW YOU HOW TO FLY. ONCE YOU HAVE UNLOCKED IT, THE FINAL PASSWORD TO ENTER IN THE SYSTEM WILL BE CLEAR.

USE CAPTAIN EVERLIGHT'S FIELD NOTEBOOK. WE THINK IT HAS EVERYTHING YOU NEED TO PROCEED.

QUESTION	ANSWER
A: The Green Byru'Mox has a great idea related to changing a project at a staff meeting. What is the most effective way to communicate that idea to zher boss, the Red Byru'Mox?	A1: Hey! We should change this project! I know how to make it way better.
	A2: Zhir, do you have a few minutes after the meeting? I have some ideas I would like to run by you.
	A3: Zhir, we have to change this now. Time is of the essence.
B: The Blue Byru'Mox's friend ruined zher portable communication device and command center. What is the best way to apolizize to zher?	B1: Companion, I am incredibly sorry for the issue I have caused. I realize that I messed up your portable communication device and command center, and this is unforgivable. I really must explain myself...
	B2: Companion, I am truly sorry. Take my portable communication device and command center. Or, I'll give you 1000 byrumoxian coins...it can't replace it, but they are all I have.
	B3: Companion, I am truly sorry and here to help.
C: The Purple Byru'Mox is having a party for Byru'Moxian Independence Day. How will zhe likely respond to the Blue Byru'Mox's refusal?	C1: But you must come! You don't have to stay the whole time if you are busy!
	C2: Okay, Companion. I understand.
	C3: Too bad. Let's get jitter juice sometime!
D: The Blue Byru'Mox can't go to the Purple Byru'Mox's party. Which response by the purple Byru'Mox would be zher most preferred?	D1: But you must come! You don't have to stay the whole time if you are busy!
	D2: Okay, Companion. I understand.
	D3: Too bad. Let's get jitter juice sometime. What is your avialability in three settings of the second sun after 1500 time segements?

Figure 5: Excerpt from the Social Distance puzzle

Each individual Byrumoxi has a preferred social distance level, either more negative or positive. To determine this level, there are snippets of digital media posts that characterize each of the distinctly colored Byrumoxi. Their profiles display their likes, dislikes, and interests while giving hints to how their preferred social distance level is determined. For example, the Green Byrumoxi likes friendships and not wasting time (see Figure 6). Therefore, it can be concluded that quick, friendly dialogue is the preferred way to communicate with this particular group of Byrumoxi. Social distance would be represented by informality and straight-to-the-point conversations (A1 on the audio transcription - see Figure 5).

This puzzle relates to each of the three pragmatic pillars as well (power, rank of imposition, and politeness). The puzzle relates to the power between the interlocutors depending on which Byrumoxi is speaking. The puzzle requires the participant to

review each of the six Byrumoxi social media pages for information about their power. The Green Byrumoxi prefers a direct way of speaking, and it can be interpreted that all communication is at the neutral level variance (see section 1 for more information about variances).

Politeness is seen in the puzzle by giving various responses to the radio requests and depending on the politeness orientation that the Byrumoxi that the participant is responding to, will determine the correct response. Using the Green Byrumoxi as the example, it can be concluded that group-oriented politeness would not be effective (A3 response in Figure 5). This is because an individual orientation of politeness is displayed through the dialogue that the Green Byrumoxi has used – in addition to their social media page.

Rank of imposition is shown by the degree of challenge in the request (for question A, asking to change a project in a staff meeting – see Figure 5). To request something of this magnitude, participants must interpret the severity of such a request by reviewing the possible answers and reflecting over the Byrumoxi social media pages to determine their preferred way in which to request something. Each puzzle within the MRE has a similar structure in how they are manufactured. This is done in an effort to repeatedly display the fundamental pragmatic pillars.

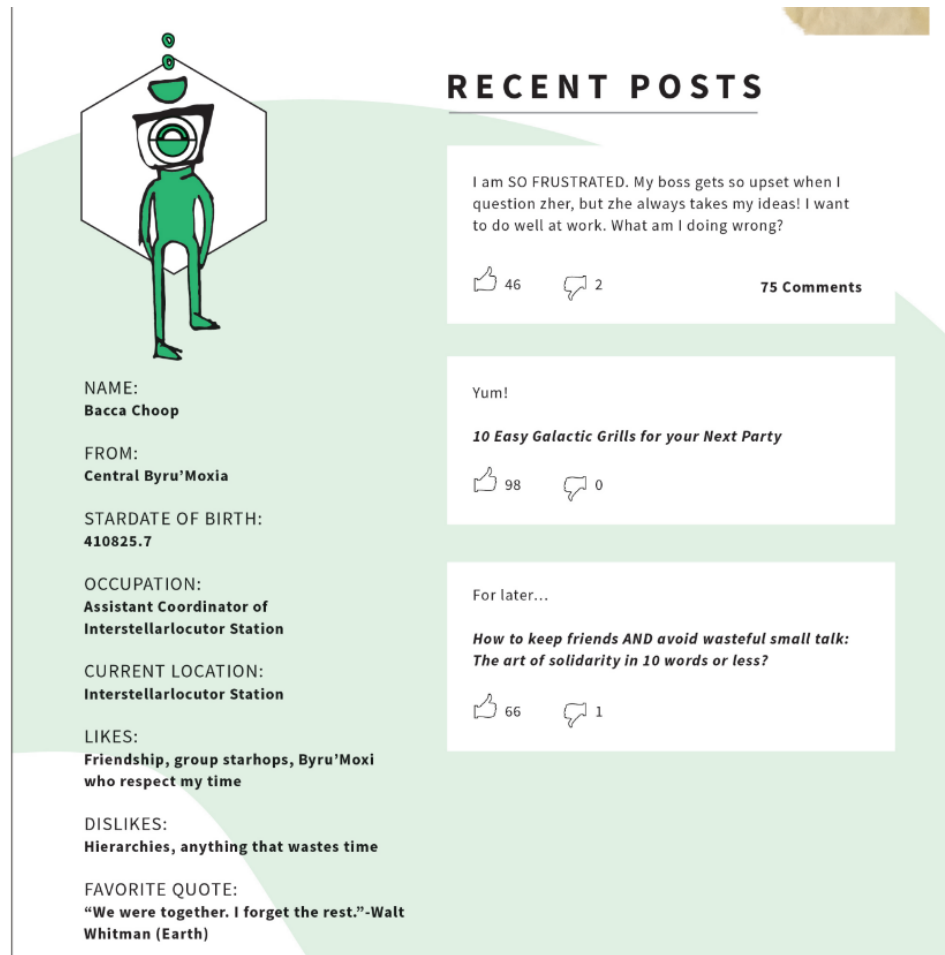


Figure 6: Social media profile of the Green Byrumoxi

3.4 Immediate and Possible Futures

There are two distinct aspects of types of futures. Immediate is the feedback from live facilitators of the MRE (replicating an instructor's feedback) and the output from the game (indication of correct/incorrect answers). The purpose is to create immediate connections supported via structured facilitation and the co-creation of meaning within the play space, compelling engagement. With the goal that the bonds will aid openness and serve as first steps toward ongoing, continued collaboration (Copley, 2002; Sykes, 2018; Daradics, Knight, & Sykes, 2022).

MREs are fabricated to encourage and perpetuate active participation like games and play. Moreover, in doing so, they formulate situations of possibility on multiple scales (Throne, 2016) that are supported with easily understood, accessible, and timely feedback.

Future social and semiotic resources teach individuals how to interact with one another in unknown situations; therefore, they can fall back on appropriate responses. Examples are social occasions (e.g., celebrations) because celebrations all have their own unique expectations and rituals associated with them. Having a set number of ‘appropriate responses’ in most situations will ease communication difficulties in those situations.

The importance of feedback is placed at the forefront of the MRE. Each group of participants has the option to ask for hints if there are situations that which they are stuck. Additionally, facilitators weave through each room, checking in.

Participants in the pilot implementation were in intercultural communications ambassador training for a significant summer games event occurring in July of 2022. What was observed from the pilot implementation is that participants’ immediate future goal is the game itself - to learn something about intercultural communication.

In July, the envoys will encounter any number of different situations where the way social distance manifests in a language is different across groups. It is expected that their experience with the MRE will help inform this experience in various ways, including the ability to assess when and how miscommunication might occur. Also, talking amongst themselves via a shared experience creates the possible unintended future for more collaboration.

4. Implications for Future Research and Teaching

This thesis presents the MRE's contribution to learning (1) superseding social structures and hierarchies, (2) integration of supportive frames and schema, (3) leveraging multimodalities, and (4) facilitating immediate and possible futures for both classroom and non-classroom settings. Learning a second language is not only the acquisition of the language but the development of new ways to self-regulate and create meaningful relationships with new people.

Systematic data analysis is beyond the scope of this project (See Appendix A). However, future work should begin to ask the questions posed here and confirm the insights found in the initial pilot implementation. MREs show the acceleration of elaborate cooperation through feedback, frames, and schema, bypassing social structures and futures. In this particular pilot, the groups who collaborated were wildly successful, some finishing in almost half the time. Future work should examine how this collaboration impacts specific learning outcomes in the four pragmatic areas addressed here.

In addition, the intervention of MREs offers significant customization capacity that can be exploited to suit proficiency standards such as ACTFL, CEFR, and American English Institute. As technology continues to improve, so does the power of the MRE.

Future research would be needed to evaluate the effectiveness of the MRE for learning the three other pragmatic elements and validate the critical pilot findings discussed here. Other aspects that would vastly improve data collection would be increased sample size and longitudinal data collection.

Furthermore, the effectiveness of in-person groups and how non-native English learners would be affected and benefit from the games. Finally, the MREs could be more widely available to implement in various classroom environments (elementary school to university level).

5. Conclusion

Observing the field of recent language acquisition means language acquisition is at an incredible potential crossroads. With technology improving rapidly, second-language acquisition's need to adapt to the changing climate is paramount (Godwin-Jones, 2016; Xie et al., 2019; Taraldsen et al., 2020). The pilot implementation suggests that efforts to develop more focused attention on pragmatic elements through an interactive way would result in a more engaged class and materials being more cemented in memory. Therefore, teaching students pragmatic elements should not be seen as a supplementary element but rather indispensable in preparing L2 learners' life journeys.

Appendix

Complications due to the Covid-19 pandemic limited the research scope of this project. However, below is the research plan developed in collaboration with the Center for Applied Second Language Studies. The project discussed here is one component of this larger study.

IPIC Cooperative Digital Language Platform

A. Introduction and Background

This project seeks to design, build, and perfect through research a digital software paradigm tool for language acquisition and retention (hereafter referred to as IPIC Cooperative Digital Language Platform; ICDLP) to be used both 1) in the university environment (class or residential environment) and 2) in individual self-study. As such, this research investigates the teaching of pragmatics and how individuals learn to use language in a functional way. For example, some learners of English are confused with the question: “How is it going?.” This question is confusing because it is a colloquial way for English speakers to greet one another, and not necessarily a question in the usual sense.

This project aims to measure and catalog such misunderstandings and teach the cultural competencies required to negotiate (or avoid completely) the misunderstandings when they arise. [Please note that there are some similarities between this and a previous “Digital Language Learning Experience” protocol. These protocols differ most greatly in their theoretical background/aims and in collaborative partners.] In addition, we will be collaborating with Margaret Malone, PhD, a researcher at the Assessment and Evaluation Language Resource Center (AELRC) at Georgetown University. AELRC is a Title VI Language Resource Center that supports the development of world language assessment. They have a review board which will handle the process on their end, and this document will be forwarded along with this protocol.

This mixed-methods study will involve data collection as a requirement of use of the ICDLP. This data will reside on CASLS/University of Oregon servers, or on Georgetown/AELRC servers. However, all use of the data for research purposes will only occur for those participants who have expressly agreed that their usage data may be utilized for research endeavors.

B. Specific Aims and Study Objectives

This project seeks to design, build, and perfect a digital platform, the ICDLP, for teaching, learning, and measuring language acquisition and retention. Specific research questions include:

RQ1: Can the ICDLP improve the teaching of pragmatic abilities?

RQ2: Can the ICDLP accurately measure pragmatic competence?

RQ3: Are learners' perceptions of their language proficiency in alignment with their demonstrated competencies?

RQ4: To what extent is demonstrated pragmatic competence correlated with demonstrated language proficiency?

C. Methods, Materials, and Analysis

i. Consent

Consent will be acquired digitally, through the ICDLP. Participants who utilize the software will have the ability to consent to having their data used for research projects. Those individuals using the software who do not consent will not have their

data utilized for research projects in any way. Further details of the consent process are outlined below (see Section E of this document and affixed Consent documents).

ii. User Profile Questions

During registration, participants will be asked to complete the User Profile Questionnaire (see Section F of this document and affixed document), a user profile about which language they are teaching and/or studying and what kind of classroom and other language study they have done. The question about language of study is necessary for interaction on the ICDLP and is required of all participants. The other profile questions are optional for all participants. Demographic data will also be captured including age, place of origin, languages spoken, and gender. For those consenting to the research study, their answers will be used for grouping data related to interactions on the ICDLP.

iii. Digital Platform Data

All actions taken by all participants using the ICDLP will be recorded, including clicks, text comments, and uploaded files, such as text, graphics, and recordings. For those consenting to the research study, these data will be analyzed to determine how participants approach and execute tasks, how long they spend on specific tasks, how they interact with other participants, and the amount and quality of foreign language production and comprehension exhibited. All results will be aggregated for reporting purposes.

iv. Participant Feedback Surveys

At the completion of each task within the ICDLP, participants who consent to the research study will be presented with a brief survey, Feedback Survey (see Section F of this document and affixed document), to obtain feedback about the task completed. These surveys are optional and can be skipped at any point. These data will be analyzed to determine participants' level of interest in the tasks, which tasks should be improved to promote learner engagement, whether the tasks were suitable for the participants' language ability, and whether the tasks functioned well technologically.

v. Audio-recording of face-to-face digital platform review sessions

Participants will be invited to ICDLP review sessions (conducted as interviews or focus groups) to provide feedback about the tasks within the platform (see Section F of this document and affixed document). These sessions will be conducted via video conference, though the participants' likeness will not be captured during these sessions. These sessions will be audio- and video-recorded and transcribed. Subjects will be informed of the recording in advance and will be able to opt in via a separate consent procedure (see Section E of this document and affixed document). Qualitative analyses will seek to determine how tasks within the ICDLP can be improved to promote participant engagement.

vi. Language Proficiency Check

Before the completion of tasks within the ICDLP, participants will be asked to complete a C-Test (see Section F of this document affixed example in Spanish), a gap-filling test, to determine their language proficiency. Before the completion of tasks, they will also be asked to answer a short set of questions, the Language Proficiency Questionnaire (see Section F of this document and affixed document), (one to five) designed to guide them in the self-evaluation of their proficiency in the language. The C-Test will be anonymously scored by research assistants, and the self-evaluation will be scored automatically and anonymously. These data will also be used in statistical analyses to compare participants demonstrated pragmatic competence, perceived language proficiency, and demonstrated language proficiency. Only results from those consenting to the study will be assessed by the researchers.

viii. Timeline

This research is iterative and designed to be congruous with usage of the ICDLP. As such, data collection will be ongoing and continual. Participants give consent for their data to be utilized for research and development purposes. In addition, participants are allowed to discontinue participation at any time.

In general, each iteration of the research will follow the schedule indicated below:

Month 1: Participant recruitment

Month 2: Participants complete tasks in this general order:

Complete User Profile Questionnaire, Language Proficiency Questionnaire, and C-Test

Complete various tasks within the ICDLP

Complete the Feedback Survey after tasks are completed within the ICDLP

Complete the interview or focus group review sessions

It is expected that the completion of the User Profile Questionnaire, Language Proficiency Questionnaire, and C-Test are completed under the supervision of research assistants in roughly 30 minutes. The various tasks within the ICDLP will be completed in about an hour under the supervision of research assistants. The Feedback Surveys will last roughly 10 minutes a piece and will be completed under the supervision of research assistants. The review sessions will be completed under the supervision of research assistants and, in some cases, the PI. All activities other than the review sessions will be completed in one two-hour block. No follow up after review sessions with participants is planned.

ix. Data analysis

All participants will be assigned a code to anonymize data. The exact type and order of statistical analyses used will depend on the specific RQs. In general, we will first test the normality of the data and remove outliers, then test our hypotheses using

regression analyses, including multilevel models and latent factor analysis. If these regression analyses provide the necessary preliminary data, we may then test for mediation. All qualitative data will be analyzed using Dedoose analysis software and coded for key patterns which align to the research question.

D. Research Population, Recruitment Methods, and Compensation

I. Participants

Participants are university teachers and students who teach and/or study a foreign language and who are using the ICDLP as part of their academic experience in a class, for self-study, or as part of a residential program. The platform is available to any student who wishes to engage or to any instructor who wishes to use it as part of their course materials – that is to say, the number is impossible to discretely determine a priori as any number of individuals in university-level courses may be exposed (by their instructor) to the ICDLP. Likewise, due to the fact that instructors will have the option to assign the ICDLP as coursework means that age is also impossible to discretely determine; thus, the study is theoretically open to any college-level student taking a foreign language and is not restricted by age (or number of participants). That being said, we anticipate roughly one hundred participants generally aged 18-25.

It is expected that all participants are fluent in English, though they may be fluent in the language of study as well or in additional languages. All surveys, questionnaires, and review sessions will be conducted in English, and the tasks completed within the ICDLP will involve the target language (currently Chinese or Spanish) as well as some English. All research assistants will be fluent in English.

ii. Recruitment Methods

In order to recruit participants, the PI and research assistants at both locations will engage in outreach via list serv announcement as well as targeted emails (see affixed documents) to department heads, language program supervisors, professors, and university students around the county. Teachers and self-study learners will be invited to participate directly by the PI and research assistants via email (see affixed document). All participants will be asked one time, upon the initial use of the ICDLP, if they would like for their data to be used in research and design. Importantly, in the potential use case of classroom intervention, instructors may require students to use the ICDLP or recommend it as an additional optional activity. However, participation in the research study **is always a choice** for the students individually.

iii. Compensation and Reimbursement

There is no potential monetary cost to participants or teachers wishing to use the ICDLP as a classroom intervention. Teachers will be compensated with ongoing free access to instructional materials. A \$15 Amazon gift card will be offered to student study participants completing at least half of the tasks within the ICDLP. AELRC/Georgetown will provide this gift card.

E. Informed Consent Process

I. Informed Consent Process

The informed consent will be completed digitally within the ICDLP, just as participants sign in to use the platform for the first time (see affixed document). This consent process will specify that only consented data will be used even when educators are using the ICDLP as a classroom intervention. Agreeing to participate in the study will in no way impact a teacher's evaluation or a student participant's grade in the relevant world language class.

Informed consent will be acquired by research instances, and in some cases, the PI. All research assistants will undergo CITI training, and the PI will hold a separate training session related to obtaining informed consent and supervising participants as they complete tasks within the ICDLP, surveys, and participate in review sessions.

ii. Facilitate Understanding

It will be made clear to the participants in the consent form that they are under no obligation to participate, and that they may withdraw consent and discontinue at any time. All effort will be made to ensure that participants will have the ability and time to read about the study, the reasoning behind the study, and the opportunity to contact the primary researcher to learn more about the study, if they so desire. Additionally, participants will be invited to ask any questions they have upon consenting and throughout the study.

iii. Documentation

Since participants consent upon the first time of accessing the ICDLP, documentation of informed consent will be stored in the platform's database. Additional documentation related to consent of recording in the video sessions will be stored on the secured CASLS/University of Oregon and AELRC/Georgetown servers. All participants will be given access to the consent documents and research materials for their records.

iv. Additional Considerations

Not applicable.

F. Participant Privacy, Data Disposition, and Data Confidentiality

I. Privacy

All participant recruitment will occur via listserv announcement and email (see affixed documents). As such, individual participants will not be identifiable by other participants during the recruitment phase of the project. Similarly, participant privacy within the platform will be protected as all participants will be assigned an anonymized code, a code that they will be given upon granting consent. In the event that more than one participant engages with the ICDLP or feedback session a time, they will be referred to by first name only. However, it is worth mentioning, that in cases in which the ICDLP is used a classroom intervention, there is no way to ensure that participants from the same classroom are unaware of the last name of their co-participants as they likely have made previous acquaintance. Code names will be used in all research scenarios with this purpose.

Privacy will be further ensured given that the review sessions will be conducted via video conferencing. Participants will be asked to turn off their cameras to ensure that their likeness is not shared with other participants' or included in the video recordings.

None of the information shared by participants as part of the study is sensitive; the data only relates to their present level of world language proficiency and demographic data are only used for data grouping purposes.

Finally, given the breadth of data sets we are considering in the study including click counts, time on task, task results, and the spoken and written opinions of learners, we will be able to draw salient conclusions related to both ICDLP iteration and to language acquisition if our data set is incomplete.

ii. Data Disposition

A variety of data will be collected: participant information, digital platform data, participant feedback surveys, audio recording of platform review sessions, and a language proficiency check (see affixed documents). The table below provides an overview of the data. All participants will be assigned a code to anonymize the data at hand. All participants will be informed of all data collected ahead of time. They may opt out of data collection at any point.

Importantly, contact information will be collected during recruitment and deleted immediately from the research database once participants are compensated for participation. In addition, all participants will be assigned a code number in order to ensure the anonymity of the data collected.

Category	Data Collected
Participant Information	<p>User Profile Questionnaire: (1) language they are studying; and (2) The kind and duration of classroom and other language study they have done. Additional demographic information will include age, place of origin, languages spoken, and gender.</p> <p>Purpose: Grouping digital platform data</p>
Digital Platform Data	<p>Participant Actions: Click counts, text comments, files uploaded or inputted (text, graphics, recordings), time on task, interactions with other participants, and the amount and quality of the target language.</p> <p>Purpose: Evaluate validity and reliability of the ICDLP</p>
Participant Feedback Surveys	<p>Feedback Survey: Perception data related to engagement, suitability for learners' language proficiency, and the technological functionality of the ICDLP.</p> <p>Purpose: Evaluate participant interest and iterate technological improvements</p>
Audio/Video Recording of Face-to-Face Digital Platform Review Sessions	<p>Recordings: Optional video conference review sessions will be conducted. Participants' likeness will not be retained. These will be audio and video recorded and transcribed.</p> <p>Purpose: Inform qualitative analyses related to improving engagement within and functionality of the ICDLP</p>
Language Proficiency Check	<p>C-Test: Gap-filling language test to determine language proficiency</p> <p>Purpose: Inform participant trajectory within the platform. Also, used in statistical analysis related to demonstrated pragmatic competence, perceived language proficiency, and demonstrated language proficiency.</p>

iii. Confidentiality

Participant's data will be coded. All participants will be assigned a code identifier to be kept separately from any identifying information. Code numbers will be used in any instance where specific subjects are discussed. Furthermore, any recordings, measures, and data will be kept in password protected files and drives. The PI will have access to the code key. This key will be retained by the PI in a password-protected, encrypted file.

The recordings themselves will be kept indefinitely for longitudinal comparisons of this learning experience with other similar (or more advanced) technologies. We will share the anonymized platform usage by using an export script to create a special database on our servers, and our collaborator will have password protected access to this database. (That is, no one else will have access.) Participant participation within the ICDLP is secure as well; any data files provided or transferred by the participants will be immediately uploaded to our secure database.

All data, including recordings, will be kept on a password protected drive and secure University of Oregon or Georgetown databases. In order to maintain anonymity, all personally identifying information will be removed from the conversations (if accidentally recorded in natural conversation). Also, only the research team will have access to the actual recordings. In all transcriptions, all identifying information will be removed and only

demographic information will be kept: age, place of origin, languages spoken, and gender. All transcripts will be completed by the PIs or members of the research team.

G. Potential Research Risks or Discomforts to Participants

Participants' confidentiality (names, coding method) will be protected according to the steps outlined in Section F, but there is always the possibility that their information could become lost or stolen or confidentiality could be breached. Although extremely unlikely, in order to protect against loss of participant confidentiality and study data, all private information will be stored behind locked doors and on password-protected computers maintained with access limited to the primary researchers. All potential subjects will be assigned a code number upon receipt of their contact information so that no personal identifiers will appear on subsequently.

H. Potential Benefits of the Research

There is no benefit to subjects other than the potential opportunity to improve their world language knowledge.

Investigator Qualifications, Roles, and Training

I. Investigator Qualifications

The PI (Dr. Julie Sykes) has significant experience conducting similar research projects at the University of Oregon, in addition to Arizona State University, the University of Minnesota, and the University of New Mexico. Careful considerations related to the use of digital technologies have been included in Dr. Sykes' research for

the past 20 years. Research projects have included the use of digital games in the classroom and a similar study on place-based learning. Dr. Sykes has completed multiple iterations of Human Subject training protocols and supervised 25 Doctoral and Master's student projects with IRB approval.

The AELRC team has separate IRB approval from Georgetown University.

ii. Roles and Research Duties

The Principal Investigator is responsible for data analyses and will provide support in all other phases of the project as needed. Research assistants will anonymize data, consent participants, record participant interactions on the ICDLP, administer and score C-Tests, administer surveys, and conduct and record platform review sessions. The PI and Research Assistants will transcribe and code recordings.

iii. Training and Oversight

The entire research team will complete CITI Training and ensure that the training is renewed throughout the course of the study. The Principal Investigator will provide training in research protocols in all phases of the study including consenting, data collection, and data analysis. All training meetings will be recorded, and CITI training certificates will be kept on file.

iv. Translator

No translator will be required.

Appendices to the Research Plan

Not applicable

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