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Training Language Mediators and Interpreters through Embodied Cognition, Immersive Learning and Virtual Reality: Didactic, Organizational and Cost Benefits

Mette Rudvin*, Edoardo Di Gennaro**, Roberta Teresa Di Rosa***

Author information

* Department of Cultures and Society, University of Palermo, Italy. Email: mette.rudvin@unipa.it

** Independent Scholar, Italy. Email: edoardo.digennaro@protonmail.ch

*** Department of Cultures and Society, University of Palermo, Italy. Email: robertateresa.dirosa@unipa.it

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Training Language Mediators and Interpreters through Embodied Cognition, Immersive Learning and Virtual Reality: Didactic, Organizational and Cost Benefits

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Abstract: The use of Virtual Reality (VR) for training purposes has expanded exponentially in the last decade. This paper specifically examines the use of VR in the training of language mediators and interpreters. By way of exemplification, the paper describes a training project at the University of Palermo, the “Coopera” project. The physically-cognitively immersive ‘learning by doing’ factor that characterizes a VR educational experience is particularly well-suited to skill-based activities. The paper explains how the immersive nature of VR and the notion of ‘embodied cognition’ is particularly suited to mediator/interpreter training by plausibly reproducing daily life situations and providing a ‘risk-free’ environment in which students can safely practice (and make mistakes) without causing harm to themselves and others, and also to contain the high costs of mediator/interpreter training. We hope the Coopera project will help foster further research into new technologies in immersive language-mediation pedagogy.

Keywords: virtual reality, language and cultural mediation, interpreter training, embodied cognition, immersive learning, soft skills, distance learning

1. Using VR for training as exemplified by the COOPERA Project

This paper describes how Virtual Reality (hereafter VR) is being experimentally adopted in a pilot project as a didactic tool for students of language and cultural mediation. We hope to shed light on how to efficiently utilize new technologies in language and interpreter training by creating a tailor-made immersive virtual-physical training environment. Although our paper is more didactically-oriented than research-oriented, we believe that this experience can also be used as a case study to propel research on immersive learning mediation pedagogy.

Starting in October 2022, the Coopera project will train 45 Italian and non-Italian ‘language mediators’ residing primarily in the municipalities of Palermo and Agrigento but also elsewhere in Italy. The project is financed by FAMI, the Italian Asylum, Migration and Integration Fund, and coordinated by the Municipality of Palermo. The 300-hour training course is organized and run by the University of Palermo at Agrigento, offering 100 hours of distance learning lessons as well as practical workshops dedicated to mediation methods and techniques, individual study and an internship. The course trainers are university professors and professionals from various fields (medicine, psychotherapy, cultural mediation, and more).

The course provides a theoretical framework as well as concrete and practical information about the profession and the practice of language mediation. The lessons are pre-recorded lectures as well as some face-to-face seminars and interactive workshops. One workshop will be dedicated to virtual teaching. The final objective of the course is twofold: to provide students with skills and competencies to enter the world of work, and to strengthen the language and cultural mediation service in Sicily. The course provides a comprehensive training framework enabling students to act confidently and professionally in the various fields in which cultural mediation is most required.

VR is particularly suited to teaching language mediation because it necessitates a practical hands-on component that is highly labour-intensive for the trainers. Typically, these training situations would be conducted through role play – a simulated dialogue – for a small group of students. Ideally there would be two trainers for each group – one for each language – providing constant face-to-face contact and feedback. The challenges for both trainers and students in this area are of a practical nature, but also interpersonal, social, psychological and motivational, and this is why ‘acting out’ a situation in an immersive VR environment is particularly interesting. By utilizing VR methodology we are able to activate not only technical/terminological skills but also ‘soft skills’ of an interpersonal and affective nature. We believe that there are enormous advantages to using VR in terms of cost (money and

human resources) and ease of organization and that the Coopera project is a perfect testing ground. To the best of our knowledge, this training format has not yet been adopted in this context.

A note on terminology: ‘Language Mediation’ and ‘Dialogue Interpreting’

In the Italian context, the term “*mediazione linguistica*” – literally translated as ‘language mediation’ – is broadly used in the academic setting to denote interpreting (oral translating) and sometimes written translation; in a conference setting the term “*interpretazione*” would be used. In the public setting it refers to interpreting for community-based institutions. In the English-language academic literature, the terms *Public Service Interpreting (PSI)* or *Community Interpreting* would generally be used to indicate this method and setting. For the purposes of this paper, given the fact that the context is Italian, we will use the term ‘language mediation’ to mean interpreting (oral translation) for public institutions and in the private welfare sector. For the purpose of this paper we will be using interpreter/mediator to refer to the Public Service- or Community Interpreter and the language mediator in the Italian context (see Rudvin-Spinzi 2014 on the terminology of ‘language mediation’). The digital methodologies described in this paper can be adopted in both of these overlapping professional domains: “*mediazione*” and ‘interpreting’.

‘Language mediation’ is dialogic in nature; that is: face-to-face bi-directional (from and into both languages) interpreting for two or more people in a real-time conversation. In terms of context, it would typically take place in a public or private institution involving an Italian-speaking representative of that institution and a person seeking the services of that institution who does not speak the host language (in our case Italian). It could take place in the health setting (hospitals, clinics, doctor’s office), the legal setting (courtroom, police station, refugee tribunal), the education setting (schools), the welfare setting (social services), or a refugee setting; in other words, where public institutions interface with migrants who do not speak the host language. The languages involved, other than Italian, would typically be the major migration-driven languages such as Arabic, Romanian, Albanian, Russian, Chinese, Bangla, Hindi/Urdu, Punjabi, Farsi, Darhi, Pushtu, Wolof, Twi, English and French as *lingua francas*, and more, depending on the number of speakers from those specific language groups living in Italy at that particular time.

How does dialogue interpreting work?

How, in practical terms, is mediation/interpreting carried out? Differently from simultaneous interpreting that is typically used in conference settings, *dialogic (or dialogue-) interpreting* takes place between a group of three

or more people – in the same location or remotely via video – where the interpreter translates segments of speech from and into both of the languages involved. Let us take the example of an Italian doctor and an English-speaking Nigerian patient. The interpreter/mediator translates into Italian for the Italian doctor and into English for the patient. The speech segments follow each other consecutively in the natural progression of the conversation – more or less spontaneously – and each party follows a sequence of speech turns (through ‘turn-taking’). When the patient finishes speaking, the interpreter/mediator translates (taking notes if required) to the best of his/her ability and memory; after the doctor replies, the interpreter/mediator translates into English what the doctor has said. Ideally, the interpreter/mediator should be controlling the allocation of speech turns to make sure that s/he has heard and remembers everything in order to be able to render it accurately. This is referred to as the ‘short-’ or ‘simple consecutive’ mode. The interpreter/mediator might be required to read a document and translate it orally as s/he is reading – so-called ‘sight-translation’ – for example the doctor’s instructions, or a prescription.

In some dialogic situations, the interpreter/mediator might be required to translate through chuchotage – a challenging simultaneous form of whispered interpreting: the interpreter/mediator whispers the translation of the doctor’s utterances into the ear of the patient (in English) *as s/he is hearing it*. After the patient has replied, s/he interprets consecutively to the doctor in Italian. Chuchotage, although extremely challenging, saves time and can facilitate the logistics of the interaction if the speakers are sitting in a large room. Chuchotage and simple consecutive are sometimes used alternately in the courtroom.

Language mediators, cultural mediators and interpreters: differences and similarities with respect to pedagogical goals and modalities

In Italy interpreter and translator training in the major European languages is provided at many universities and in some universities for major non-European languages such as Arabic and Chinese. In many of these universities this is loosely referred to as ‘language mediation’ and encompasses a broad range of translational activities. However, there are far fewer training opportunities for language mediation (as it is used in this paper, i.e. Public service interpreting or Community Interpreting); indeed there is little formal interpreter training for language/cultural mediators operating in the public sector, especially for non-European languages (see Part 2 below). Note that in Italy, in the public sector, the umbrella term ‘cultural and linguistic mediator’ is used to denote a far broader, more agentive and advocative, professional figure than what is common in other Western countries where

this figure might be referred to as a patient advocate or cultural broker (see Rudvin and Spinzi 2014).

Many language- and cultural mediators working in the public sector or for NGOs are trained through those same NGOs or local government bodies, or they could be auto-didacts trained 'on the job'. There is a significant difference between the academic setting (European languages, a focus on interpreting and translation techniques, job opportunities in relatively highly paid settings, primarily Italian students) versus the public sector (1st or 2nd generation Italians from migrant families, very little technical interpreter training and very low pay).

In the Coopera project, as mentioned, the training format is geared towards distance learning. As far as the theoretical modules are concerned, this works well, but teaching interpreting in this format is challenging. One of the ways in which we can enhance the feasibility and sustainability of interpreter-training at a distance is precisely by using VR. Although it is still not a substitute for in-person student-trainer contact, it (partly) solves the logistical and intrinsic problems of teaching at a distance and can provide a high-quality immersive learning situation.

In a hands-on discipline such as translation or interpreting, and certainly mediation in any sense of the word, the challenges in a distance learning VR format are significant, but we believe that with the right, bespoke software and with proper guidance from the trainers, the situation holds much promise. This applies both to interpreting 'proper', as will be described in Part 4, but it applies also to 'cultural mediation' (see Part 4). Cultural mediation, in the sense of 'brokerage', is a different practice compared to interpreting (one might say a 'participatory versus impartial' approach respectively). Although we will not discuss the training implications for cultural mediation/ brokering in this paper, there are a number of interesting opportunities where VR role-play could be used to practice active mediation processes tackling intercultural, pragmatic and ethical issues. Brokering such situations can be simulated through VR based role-play where complex culture-based conflict resolution can be practised and solved in an immersive situation rather than simply through description.

What is VR? New frontiers

The Covid-19 pandemic has changed many former paradigms of everyday life, and the use of online platforms are forcing us to rethink educational instruments in the classroom. Developments and opportunities in the area of virtual learning environments (VLE), where the student is immersed in an environment that simulates a specific 'virtual' reality, are advancing at a purely technical level. VR is "a system that aims to simulate real-life experiences, providing topography, movement, and physics that offer the illusion

of being there” (Lin and Lan 2015, p. 487). It holds much potential as a pedagogical tool, especially – but not only – in a distance-learning context or as a buffer for future pandemics.

The use of VR for training purposes has expanded exponentially in the last decade, and has become increasingly sophisticated and interactive in its application, “with a high degree of visual appeal” (Lin & Lan 2015, p. 486). Where VR was used primarily in skill-based activities – such as surgery in the medical field – research is being conducted in a wide range of other fields such as virtual tourism (Cheng, Yang & Andersen 2017, Lin & Lan, 2015) and language learning. The latter area is the most relevant application to our case study¹.

The embodied nature of VR allows students to practice more realistically but also safely; this is clearly crucial in a setting such as surgery (Cheng, Yang & Andersen 2017), but it is also relevant to our field. In a VR context, students can make mistakes, learn from their mistakes, pause, etc. without causing harm to others. Being able to safely practice interpreting in an operating theatre, or a courtroom before interpreting ‘live’, greatly reduces potential harm. The same principle – simulating a dialogue without causing harm – is of course true of a simulated role play, but a classroom situation role-play does not have the same organizational flexibility or immersive impact as VR (depending of course on the quality of the classroom situation and of the VR platform). As will be discussed more fully in Part 3, the sense of ‘embodiment’ is the crucial factor here. Cheng, Yang & Andersen (2017:2) observe that the “sense of *presence* [...] is the defining experience of virtual reality. [...] Immersion and involvement are both necessary for experiencing presence, and presence leads to increased learning and performance [...]” An exchange is made more engaging “by creating a holistic experience in a 3D virtual reality video game” (ibid.). “VR presents a realistic virtual space and visible “classmates” who assist students in gaining a sense of participation and building emotional bonds (positive or negative) with their collaborative partners (e.g., Collentine, 2011; Deutschmann et al. 2009; Peterson, 2012b; Lin & Lan 2015, p. 493).

¹ See Jack Ratcliffe and Laurissa Tokarchuk (2020). A number of academic journals are dedicated to technology and language learning, such as ET&S (Educational Technology & Society). ReCALL, the journal of the European Association for Computer Assisted Language Learning, is dedicated to the use of technology in language learning, including L2 acquisition (<https://www.cambridge.org/core/journals/recall#>).

2. The Intercultural Mediator as a social agent. Training, research and digital innovation

The Italian ‘mediator’. Cultural mediators and the Coopera project

In the 1990s, with the intensification of incoming migratory flows, a new professional figure, the intercultural mediator, emerged and became widespread in Italy. The job-description of the intercultural mediator in areas relating to security, migration reception and services, was not only to translate the language, but also to explain cultural aspects, to help solve problems, propose solutions, and mediate in conflicts – in other words a pro-active and engaged agent. In the most agentive roles, they would also be involved in planning and enhancing resources in order to facilitate peaceful coexistence between foreign citizens on the one hand and the Italian population and institutions on the other. Over the years, with the arrival of refugees from Africa and other war-torn areas of the world, the figure of the intercultural mediator came to play a central role in temporary reception centers for adults and minors.

In addition to knowledge of the language of origin and of Italian, mediation requires a good knowledge of both the immigrants’ culture of origin and that of the country of arrival. The ideal profile of the intercultural mediator is therefore a good knowledge of the country and culture of origin, having lived long enough in Italy to know the language, customs, culture, political, social, administrative and cultural system (or born in Italy in a migrant family); or vice-versa an Italian person who has intimate knowledge another culture and language(s). Intercultural mediation services are differentiated according to areas of specialization, situations and needs. The intercultural mediator is a professional figure who works to facilitate interaction, collaboration and coexistence in multicultural environments, both among citizens of different origins and cultures and with public institutions, as mentioned. Differently from community interpreters in many other countries, the functions of mediation are numerous: translation; interpersonal communication taking into account cultural, ethnic, religious, gender and experiential differences; knowing how to listen and be empathetic; recognizing and valuing differences; and much more. The areas of intervention span the educational and training system; health; justice; public administration; migrant security and reception issues; as well as the private non-profit sector (Civil Protection, Red Cross, NGOs, secular and religious associations).

Multiculturality, or rather the simultaneous presence in a given physical or relational space of different groups with their own specific culture (Cesareo, 2000), is achieved through various non-linear processes, on different levels, of a migrant’s insertion into the socio-political structure and culture of the host country. This co-existence may produce outcomes that can some-

times be highly destabilizing for the social equilibrium and may result in conflicts that are not easy to resolve, or at least a situation of fear, rejection of the Other, or more widespread tension in the face of incommunicability and/or diversity.

Digital technologies in cultural mediation

Numerous studies² on mediation between cultures have examined the characteristics of such practices and explore how to effectively develop the potential of mediation interventions through training that include precisely the integration of learning through new technologies. In the Coopera project, the innovative dimension is developed both with respect to the online distance learning training channel, which will take place mainly through recorded lessons uploaded to the university website, and with respect to the inclusion of VR teaching tools in the in-presence workshops. This pilot project is being developed to help future mediators acquire the necessary skills and competencies to face the challenges of negotiating the complexity of the 'real' world of migration. Indeed, this complexity will require many different types of mediation interventions according to the specific contexts and migration projects that they are expected to perform, especially (in the case of the Coopera project) receiving and accompanying migrants in the reception system and in the social and health services.

This construction of intervention skills, virtually experienced in very different contexts and in situations and environmental conditions of different emotional impact, allows the students to offer a more appropriate intervention in terms of response to the need for communication (linguistic and otherwise). Opening up to the use of digital resources, derived in part from the use of technology during the pandemic experience, should be considered a stable acquisition that opens up new scenarios of training and intervention. In the case at issue, it is through the constant virtual re-enacting that mediators in training can develop skills in a variety of contexts, proactively 'living' a training experience that would otherwise be much less extensive if it were limited only to internships and to a limited number of contexts.

The Coopera teaching plan includes a strong interdisciplinary focus in order to introduce the students to all key areas of the reception and integration process with content from various areas (legal, anthropological, health, school, hospital, community, social) to be combined with learning specific language-transfer techniques. This construction of intervention skills, virtually experienced in very different contexts and in situations and environmental conditions of different emotional impact, enables the students to provide

² See Demorgon & Lipiansky, 1999; Belpiede, 2002; Aluffi Pentini, 2004; Di Rosa, 2005; Favaro, G. & Fumagalli, M. 2004; Cudini, 2011; Esposito & Vezzadini, 2011; Grisoni & Colombero, 2015.

a more appropriate intervention responding to the specific communicative needs (linguistic and otherwise). Experienced trainers for each specific area will monitor students' learning through in-progress tests at the end of each module to identify and resolve any critical issues in a timely manner.

The application of digital teaching tools will enable students to experience themselves *in situ* in a wide range of situations and contexts, so that they also gain an awareness of the complexity of their task. Trainers conducting the in-person workshops will be able to monitor learning through group activities.

At the same time, it will enable the students, mainly second-generation migrants and/or migrants who work as mediators, to strengthen their digital skills and deepen their use of them for professional purposes, in line with what is contained in the most up-to-date European-level indications which set as a specific goal of action investment in the digital competence of migrants as new practices of inclusion and citizenship. For the same reason, alongside the lessons, activities have been planned to measure and monitor the digital fluency of the students, which will converge in qualitative participatory evaluation activities at the end of the course.

The improvement in the quality of the service already provided in an interpreting situation can strengthen its social value in the context of a more articulated intervention in order to promote integration. By developing software that can offer an increasingly wide range of "situational approaches" with a strong interdisciplinary connection between scholars and technology experts, we will be able to adopt more advanced and sophisticated tools in more complex situations. This further allows us to train mediators in the community in other areas as well, such as the educational sector, both in Italy and in international contexts, aimed at respect for diversity and empowerment of communities, leading to enhanced public recognition and safeguarding of our foreign citizens.

3. The cognitive process: embodied cognition, the grounded theory

Embodied cognition, neural patterns and immersive learning

The pedagogical aim of this paper – to optimize training for language mediators – is informed by a number of recent theories regarding language learning, comprehension and production, and can be encapsulated through the notion of 'embodied cognition', namely that of following the interactions of neurons occurring naturally in our brain; didactic activities aim to reproduce precisely this brain activity. According to the theories of embodied, situated, grounded and enacted cognition postulated by Barsalou (2008;

2016), there is clear evidence that our brain is able to mentally represent the interaction with an object or the experience within events. That is to say, we can represent in our mind all the features of an object recorded through our different senses. The most relevant factor is the activation of the sensory-motor system that is able to connect the experience to the motor cortex, thus linking different sections of our brain so that they interact for the storage and retrieval processes. In short, Barsalou (2008) suggests that it is through simulations and simulators we can represent, imagine and predict what an object/action is: our cortexes cooperate when activated by an input: they enact and represent the object-related bodily states and features stored in our memory. When we come across a bottle for instance, even if we do not establish a physical interaction with it, our visual, audio and motor cortex are activated; we could imagine this process as a “priming” mental representation, including features and actions recorded during the previous experiences. Metaphorically speaking, we could imagine a bottle resulting from the mixture of the different characteristics stored in our brain, connected at the same time with all the actions we can do with it. We could define it as the creation of the prototypical categories we need to learn from the external inputs. Thus, we can recognize the surrounding world and we can learn step by step how to interact with it. It can be either a conscious or unconscious process: once we have experienced an interaction, our brain is able to remember it and retrieve memories whenever necessary to a specific situation (Barsalou 2008).

Multimodal channels

Wang and Wen (2021) have analysed the differences between a traditional learning environment and the virtual contexts. With respect to traditional methods, virtual distance interactions involve a multichannel perception due to the variety of digital resources used. This fosters student autonomy while learning. Indeed, students can interact and then influence each other through various multimedia tools. As we will see in Parts 4 and 5, the students can move their hands to interact with objects and with the peer-based avatars, strengthening their embodied knowledge and memory. Thus, the multimodal VR approach – reproducing a real-life situation – is potentially beneficial to boost memory storage, retrieving and long-term learning.

The situated, grounded and enacted nature of VR will impact on pragmatic aspects in the body-space relation. It is a multimodal process that becomes embodied when we can represent the world and our interactions with it, the ultimate goal being learning. In short, we could sum it up thus: when we listen to words or interact with objects, we need and create a mental representation of them. Watching, imagining or doing actions activate a similar neuronal pattern (in a conscious or unconscious multimodal pro-

cess). The parts of our brain aimed at visual processing are activated while naming colours, for example, or animals; neural regions related to grasping may be enacted when perceiving and naming objects.

Neural patterns and grounded theory

'Neural patterning' is the most important assumption of our theoretical approach to VR language learning. Its contribution to grounded theory highlights the 'Massive redeployment hypothesis' (MRH), for which the human cortex evolved through the so-called "neural expansion": Anderson (2008) clarifies that neural patterns developed for serving specific purposes that changed with the passing of time, shifting their focus from one task to another.

Consequently, the embodied cognition theory suggests that learning while accomplishing a task allows the student to acquire long-term linguistic competences (verbal/ non-verbal language, body gestures, pragmatics, fluency, lexicon).

Student-centred environments: motivation

Wang and Wen point out that the subject of this new type of interaction is human rather than non-social, thus emphasizing social relations. In recent years teaching trends have highlighted the importance of creating student-centred learning environments. That should probably increase the intrinsic motivation in every student approaching this new method. Being active during the learning process, as Ciliberti claims (Ciliberti, 2019) is fundamental in order to establish a collaborative attitude among users, and it fosters students' creativity, collaboration and commitment while accomplishing a task. Including personalised activities that engage students with respect to affect/emotion is thus effective. Video gaming, learning by doing, VR interaction, etc. can increase student motivation: the more they practise in the VR, the more they will be interested in learning and acquiring competences. One of the advantages to this project is that it allows us to 'reduce distances' between peers and trainer/students, fostering collaboration between colleagues who will share knowledge and abilities, allowing them to self-correct in the learning process.

4. Training: Role play and immersive learning through VR

In collaboration with the software company *Vection* in Bologna we have prepared a tailor-made software platform that includes various scenarios that the students will likely face in their professional lives, primarily in the health and welfare/refugee sectors, for example: conversations between Italian service providers (physician, psychiatrist, welfare officer, policeman, UNHCR official, etc.) and non-Italian speaking clients (patient, refugee, mi-

grant). Instead of using traditional physical classroom role-play situations, we will be hosting the role plays on a digital platform with dedicated avatars that the students will access using a visor, as in a 3D gaming situation. There are a number of other intrinsic, didactic advantages to this format.

Most importantly, it provides a fully immersive experience where students virtually interact with each other and with the trainer as avatars; in this way, they will be able to test out professional scenarios before experiencing them in real life. As Ciliberti (2019) suggests, an interactive peer-to-peer approach fosters students' creativity, collaboration and commitment. It is precisely the 'learning by doing' aspect, the 'situated' as well as 'immersive' learning (ibid), that is crucial to the success of this methodology.

What is Role Play?

Let us look more closely at how a role-play is played out in the classroom in order to examine more closely how VR can be utilized most effectively: The goal of any dialogic interpreting role play, through simulated dialogue, is to immerse oneself in a situation as if one were actually there and thus test one's own reactions to that situation and – in an exam situation – to demonstrate that ability to the assessor. By engaging in role play over time, the student becomes familiar with the physical environment by internalizing it and by creating a process of habituation, whereby the environment, the activity and the students' own reactions become automatic (this is of course what happens through practice in any skill-based activity). The students further learn to assess their own techniques, reactions, weaknesses and strengths and are in a position to reflect on their own performance.

The enacted communication in a simulated dialogue is not based solely on vocabulary or turn-taking and the need to accurately represent what the speakers actually say. Conversation coordination (limiting the length of turns) is crucial in order to hear and to remember what is being said by all the speakers, the interpreter/mediator must learn to interrupt when they find that a speaker is speaking for so long that they risk forgetting what was said or when an utterance is so fast, indistinct, soft or unclear as to jeopardize comprehension. It is imperative that the interpreter/mediator interrupt the flow of conversation in order to capture exactly what is being said and, if necessary, to ask for repetition or clarification. This is a particularly daunting task for many students and beginning professionals.

Body language and conversation coordination

Overcoming shyness and learning to insert oneself proactively into the organization – not the content – of the conversation is thus a very important part of the interpreter/mediator's task, and one that can be learned through immersive experience. The more immersive (realistic) the situation is, the more useful it will be for the student to internalize proactive (and sometimes

assertive) conversation coordination as well as other ‘soft skills’; these soft skills cannot be learned – and internalized – solely through a theoretical understanding. Gaze and body language are also crucial to the enactment of the conversation in that they facilitate or obstruct communication and comprehension. Lastly, voice projection (articulation, clarity and volume) is another motoric skill that can be practiced in immersive training.

Example

To illustrate the basic format of dialogue interpreter training, let us take a logistically simple example of role-playing a patient-doctor consultation where the doctor is Italian, the patient is an English speaking Nigerian and the interpreter/mediator is a bilingual English-Italian speaker. Following a scripted dialogue provided by the trainer, one student will play the Italian doctor, one student will play the Nigerian patient, and one student will interpret; the students take turns to interpret (as described in the ‘simple consecutive’ turn-taking format above). The student who is interpreting will orally translate the doctor’s questions and observations into English and the patient’s answers, questions and observations into Italian, following the natural flow of the patient-doctor conversation. The student will strive to remember and reproduce as accurately as possible what is being said, interrupting if necessary when the segments become too long or too complex to remember or when clarification/repetition is required; s/he takes notes if necessary.

This is the classical role-play format. The trainer will provide feedback regarding the accuracy of the rendition (translation) and the students’ performance as regards conversation management and other aspects of communication (body language, voice projection, etc.).

For interpreter training, therefore, the immersive multimodal experience does not only test terminology and foster mnemonic skills, but also supra-linguistic pragmatic communicative/interpersonal features and conversation coordination (turn-taking and interrupting; gaze and body language; active listening; voice projection). According to Tian et al. (2020), where the initial input/stimuli is rich, the impact on memory will be increased (and thus easier to retrieve for an interpreter student). Making the scripts progressively more challenging in terms of terminology and content adds complexity to the tasks and will improve didactic efficacy. Stress factors – that can be increased as the students improve – include overlapping speech (in different languages), high noise level, poor acoustics, etc. In this way, students learn to manage high-stress situations (‘internalizing’ these situations) and are equipped with these skills before entering a ‘real-life’ situation. We believe, the interpreter is also less likely to unwittingly demonstrate emotion openly and thus unwittingly impact the interpreting session (this is especially important in the courtroom).

How does it work in practice? VR and immersive role-play. Using avatars instead of trainers

The same role-play situation described above can be enacted virtually through VR in the following way: Each student has a visor attached to a dedicated platform and their corresponding avatar in the virtual doctor's office. The doctor's office is equipped with a physician-avatar, a patient-avatar and the student-interpreter avatar.

Two students – interacting as patient and doctor avatars – read a scripted Italian-English patient-doctor dialogue. In the same way, as if this were taking place in a physical classroom, the student-interpreter will then translate each segment from Italian into English and vice versa. The two students and trainer can either be together in a classroom, or in separate locations, if necessary. The other students will follow on the computer. If only one or a few visors are available, the students can take turns using the visor and the other students can follow the virtual situation on the computer. Although more expensive, with several visors and computer stations available, each student can interact directly through an avatar.

Through avatars, the above stressors can be introduced. The VR format allows students to practice conversation coordination (turn-taking and interrupting; gaze and body language; active listening; and voice projection) in an immersive manner.

Trainer observation: the trainer can actively participate by following the interaction on the computer – or engage him/herself through an avatar – by providing observations. We thus have a format where the students and the trainer are following the same virtual situation in multiple geographical locations but have the perception of being in the same room, and are interactively and constructively creating a situation that simulates a real-life doctor-patient interaction. Trainers can incrementally increase the level of difficulty and the number of added stressors in the pre-scripted dialogue, or act it out directly through the avatars, in the same way as they would in a real classroom situation.

As well as sensorial stressors the students will also be given emotionally challenging situations to test their ability to deal with affective and ethical complexity. VR is well suited for testing high-stress affective features, especially empathy-building in complex affect-based situations. This pre-emptive immersive experience will also help students to become familiar with their own reactions to traumatic content (seriously ill people, accident victims, blood etc.) and to their own levels of empathy (see Rudvin and Carfagnini 2021). Having pre-emptively experienced one's own reaction to traumatic situations, it will also make decision-making easier if and when a potential ethical dilemma arises.

Students thus learn to pre-emptively manage their emotions, stress reactions and decision-making as well as the more technical aspects of interpreting. Having reflected on their own empathic reactions together with their trainers and peers (assessing their own techniques, reactions, flaws, strengths; reflecting on their own performance), they will be able to better avoid potential burn-out and also to pre-emptively practice decision-making (ethical dilemmas as well as communicative obstacles). This immersive strategy not only helps them to handle their emotions and stress, but is a valuable mnemonic tool, fostering long-term learning acquisition.

‘Natural order of acquisition theory’ and physicality – moving in the space provided

The novel element of a virtual learning environment is precisely its immersive nature, meaning that the student engages in the learning situation cognitively and affectively as if s/he were actually there, in the ‘real-life’ situation. According to the ‘natural order of acquisition theory’, there is a natural/procedural order of the different linguistic elements that students acquire during foreign language input. It is strictly interconnected to the input theory, through which Krashen suggests that students can learn when an input is clear and naturally/gradually increases in terms of difficulty (Krashen 1985; Pienemann, 2006). When students are faced with a difficulty of which they have previous knowledge and when an input is new, it can be understood if supported with contextual, linguistic and extra linguistic information (Krashen 1985). For the student, motorically and cognitively acting out an interpretation will provide them with the work experience they lack from a traditional classroom setting. In this way, if the student is ‘synthetically’ immersed in a learning environment, s/he can acquire more effectively, more cheaply and possibly more safely those practical skills that s/he would be learning in the classroom.

As Cheng, Yang & Andersen observe (*ibid*), incorporating interaction into VR training can be a challenge, and studies have shown that presence is felt more strongly when users actually walk around, physically speaking, rather than just pressing a button. This is an aspect that we have factored into the software application (as Cheng et al did with the physical bowing movement mentioned above and more specifically through a first-person perspective – ability to navigate, ability to interact with other virtual avatars, environmental consistency, high resolution graphics). This sense of immersion should be maximised (Cheng, Yang & Andersen 2017:2-3).

Role play in a digital environment: The importance of good software

The core of the Coopera project is to train students through custom-built software by developing an innovative and technological training method.

An important caveat, however, is that VR works well as a digital learning instrument only if and when the content creators can plausibly reproduce the daily life situations that mediators would face. The primary advantage of VR is that it allows us to recreate a precise environment and a virtual immersive space in which students will train in a 'consequence free context', i.e. not risking to harm a third party. Thus, an incorrect translation or intrusive affective factors would not impact the situation as it would in 'the real world'. The learning by doing factor and the perception of really being there are the two main tenets of this new method: let the students train in an immersive learning environment as if they were living a real situation.

5. Technical requirements: Virtual Reality Education Software and hardware 4.0

The software

Today, VR is used for many purposes in many contexts: gaming, industry, education, programming, filming, medicine etc. Since VR is a very versatile technology, we can create several virtual environments where users can interact each time with different objects in many different interactional/communicative situations. If we were to think of VR as a new tool for education it could be useful to compare it to AI (Artificial Intelligence), although there is a slight difference between the two fields; algorithms, machine learning etc. have different roles in the two methods.

This technology has been specifically realized for the Coopera project. We will be adopting the Alma Virtual platform which consists of a powerful VR engine that allows users to experience different educational situations. Through the visor, students will have the possibility to interact with the VR environment by using the controls. As specified above, we do not need a computer: the software will be supported exclusively by the headset, as its components are similar to a computer hardware. The students can grab objects, take them from one place to another, listen to audio clips and the teachers' voice, and answer with a 3D output and input sound system.

The Hardware: Oculus Quest 2 visor

The Oculus Quest 2 headset is the best technology on offer; although in the coming years improved hardware will also be available. It is a powerful visor, with a display of 1,832 x 1,920 pixels per eye, with a fast-switch LCD, 72 Hz (available soon 90 Hz); the processor is Qualcomm Snapdragon XR2, equipped with an internal memory of 64/256 GB and RAM of 6 GB. Its audio performances are good, including 3D positional speakers with a 3.5mm jack. The eye-tracking is supported by Oculus Insight tech that boasts 6 degrees of 'freedom head and hand tracking'. The visor is not too heavy and

weighs only 503 g. Similarly, the controls weight is ca. 162 g each, charged by AA batteries. The visors are approximately 191.5 mm x 102 mm x 142.5 mm (strap folded), 191.5 mm x 102 mm x 295.5 mm (strap fully extended). The charging time is about 2.5 hours, with a USB Type-C cable power supply.

Before entering into the virtual environments, we must ensure that we are in a well illuminated area so that the headset recognises the surrounding space. This is crucial in order to track the physical space around the avatars and students, limited by the manual mapping. Later, we can diminish the light so that it shows the VR content on a light-board or on a wall. Oculus Quest 2 is the most suitable technology for these activities, but the hardware should have the following basic requirements: Intel i3-6100/AMD Ryzen 3 1200: processor, FX4350 or greater; NVIDIA GTX 1050 Ti/AMD Radeon RX 470 graphics Card or greater; alternative Graphics Card: NVIDIA GTX 960 4 GB/AMD Radeon R9 290 or greater; operating System: Windows 10; 8 GB RAM and 1x USB 3.0 port.

Virtual Environments. What can we do? Settings, additional options and virtual objects

This technology allows us to create any virtual environment or interactive object we need for our lessons, as required by the objectives and the learning requirements; this could range from a simple room to natural open spaces/environments (the costs would rise for complex tasks and personalisation).

Before accessing the platform, the headset maps the physical space in order to find spatial obstacles or boundaries, reproducing on the floor a line within which we can physically move. We can then access the previously created VR environment. Once inside the virtual room, we can interact with the different virtual objects (even without using the controllers): Oculus Quest 2 technology does not need additional devices to interact in the VR platform. Trainers can use the controls to make direct arrangements and set all the features that they consider to be important for each environment (i.e. select the environment, insert additional objects etc.).

Students can move their hands to interact with objects and with the peer-guided avatars; the Oculus headset also recognizes some of the main hand/body movements. While performing, the movement/object interaction strengthens the students' embodied knowledge, especially with regard to memory, both in information retrieving and storing process.

It is possible to recreate any object and make it interactive in a highly realistic way. For the basic settings, the trainer needs to use controllers that allow them to "jump" around and explore the virtual space. Different buttons are used to select and interact with the objects. The cameras can

be set to record, or simply to watch what happens in the virtual room; this can be from any given point, or from any user's view. We can write floating captions with the 3D painting brush, we can take objects, insert multimedia files, show videos etc. It is possible to expand an object to look at the smaller components. It is also possible to surf the net directly in the virtual room on a dedicated panel. These are only a few of the possibilities that the platform offers; the platforms are continuously developing and adapting to users' necessities. In order to practise and train with different interpreting and mediation techniques, we aim to adapt input and output audio settings of this platform in order to recreate the conditions to simulate other interpreter training modes such as chuchotage.

6. Conclusions: Evaluating the effectiveness of VR training

In this paper we have described how the associative aspect of embodied learning operates at several levels for students of interpreting and language mediation. First and foremost, they learn and practice interpreting skills, thus internalizing them to the degree that they become automatically activated; through the avatars, they are exposed to situations of affect (empathy, sympathy, dislike) so that those situations that could unwittingly trigger trauma will have less of an emotional impact on the interpreter. The interpreter/mediator is also less likely to unwittingly demonstrate emotion openly and thus unwittingly impact the interpreting session. The VR format also allows students to practice conversation coordination, one of the most important dialogue interpreting skills (especially turn-taking and interrupting; gaze and body language; active listening; and voice projection). Thus, the immersive experience of VR in interpreter training not only tests terminology and allows the students to become familiar with the physical milieu, but also with the supra-linguistic pragmatic and communicative features. The 'learning by doing' aspect, the 'situated learning', is crucial to the success of this methodology. Situated learning is further enhanced by collaborating with peers and sharing experiences interactively. To the best of our knowledge, this training format has not yet been adopted in Italy in this context. We believe that there are enormous advantages to using VR in this context in terms of cost (money and human resources) and organization; the Coopera project is a perfect testing ground for using VR in interpreter training.

Establishing criteria to gauge the effectiveness of VR training

However, determining the criteria for assessing a good proficiency in interpreting and mediation is not simple. In this paper we have aimed to establish which precise skills and competencies can be trained through VR,

language competence being the most important for handling real life interactional situations. In order to evaluate the effectiveness of this method we have prepared a general questionnaire that will be administered to the students before they begin the VR activity to establish language-related data such as their mother tongue, proficiency in their working languages, as well as sex, age, nationality, educational qualifications and work experience. The students will be asked to provide substantive information regarding previous work experiences and their perceived strengths and weaknesses also in terms of interpreting competence. At the end of the course, these same questions will be asked in order to monitor self-perceived progress and self-perceived digital literacy with respect to VR as an interpreting tool.

During the final exam that includes an assessed (not VR) professional role-play, we will be able to evaluate their performance to test their skills and competences, especially interpreting accuracy, familiarity with field-specific as well as every-day terminology, conversation-management, memory, fluency, knowledge of the issues involving precise institutions and legal/social procedures, empathy control and problem-solving. We can thus assess the improvement in performance and consistency from a time T_0 , considering the students' initial competences, to a time T_i at the completion of the entire project. This will be a fundamental step to assess how this new method can help them increase their knowledge and develop their capabilities in a virtual environment.

Last but not least, students' own opinions will be an important criterion in order to gauge the effectiveness and success of VR as a tool for interpreter/mediation training. Once they have completed the course and the final assessment tasks, they will be asked to describe their experience with VR and will be encouraged to offer any useful suggestions they might have to enhance learning. All the information, including the student-independent variables such as technological user-friendliness, time handling and the differing skill levels of individuals in the group, will be useful data to improve both software and didactic strategies for future projects.

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