Language Teaching, Language Learning, and Virtual Exchange in an Age of Complexity

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ABSTRACT

As the introduction to this special issue on virtual exchange (VE), this paper presents a glimpse back at the development of VE through the lens of the central definitions that have been historically associated with VE and how these have had an impact on the evolution of VE practice and research. Next, the role of intercultural competence (IC) is discussed. IC is a prominent aspect of VE in foreign language education and also emerges as a primary topic in the articles in this special issue. Given that VE is most commonly identified within formal education contexts, the article then foregrounds recent debate on whether VE is an educational approach or method and how this may impact teacher education. Finally, looking forward, the text outlines the importance of VE for upcoming generations and how VE might keep pace with anticipated technological advances.

KEYWORDS

INTRODUCTION

Advances in Technology, Advances in Virtual Exchange in Education

In the face of a worldwide swing towards online teaching, brought about by the global pandemic that began in 2019, one might ask why a special issue on Virtual Exchange (VE) is needed. Are not all teachers now adept at the use of communication technology for teaching? After the author was invited to present an overview and introduction to this Special Issue, these were some of the questions that immediately came to their mind and the eventual response was yes. As teachers working online are gaining confidence in their techno-pedagogical skills, which include a willingness to experiment with VE in their teaching, a close look at VE practices is precisely what is needed now. While recent publications on online teaching may give the impression that digital exchanges between geographically-distanced learning partners are new in educational contexts, this is not the case (Colpaert, 2020). VE has been implemented in education for several decades (O'Dowd & O'Rourke, 2019) although interest is growing exponentially (Godwin-Jones, 2019). As this practice grows in popularity, it behooves educators (teachers, policy-makers, and education stake-holders) to learn from past experiences and to better understand how VE has developed and is currently understood by teachers and researchers.

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Increasingly sophisticated technology has become pervasive in so many different aspects of people's everyday lives, it is often argued that teachers have the responsibility of revolutionizing teaching and learning through the use of these technological advances (Organisation for Economic Co-operation and Development [OECD], 2021). According to the OECD report, technology is considered to be the "backbone" for educating the 21st century citizenry. This pattern of making educational agents responsible for preparing technologically savvy citizens is frequently embedded in national policies, often conforming to general public rhetoric about technology in society (Trucano, 2016).

As the physical size of technological equipment decreased and became more mobile, its use by individuals predictably became more mainstream (Bax, 2003, 2011). This is exemplified in the history of the Personal Computer (PC). The first PCs became available to the general public in the early 1970s (Ceruzzi, 1998). The shift from computers that were so large and sophisticated that they required warehouse-sized spaces to computers that could sit on a desktop has been regarded as a social transformation along the lines of the industrial revolution, impacting all areas of society (Zobel, 2016), including education (Jones & Scanlon, 1987; McMeen, 1986; Willis, 1981). This, in turn, was followed by rapid advances in computer networking. The connection across distances between computers (computers "talking" to each other) initially began in universities, computer laboratories, and military industries (National Science and Media Museum, 2020). PCs and the internet then became key technological advances that were integrated into more and more classrooms across the globe (OECD, 2021). Subsequently, as the use of communicating via connected computers came to be more prevalent in society, teaching students how to use technology eventually became part of national curricula (Trucano, 2016).

As regards VE, the augmentation of access to internet connections and computers gave rise to a significant increase in opportunities for connecting teaching and learning inside the classroom with learning outside of the physical boundaries of the school walls (Godwin-Jones, 2018). These new technology-mediated learning environments have also led to more collaborative work being carried out between distanced classes, particularly in language education (Dooly & Vinagre, 2021). As studies and publications on technology-mediated teaching practice began to emerge from the mid-1990s onwards (e.g. Angeli, 2005; Bustos & Nussbaum, 2009; Davis, 1989; Doering et al., 2014; Lei & Zhao, 2007; Mumtaz, 2000; OECD, 2006), researchers began to highlight how the use of technology can present inherent problems and may even result in pushback from the main stakeholders: teachers, students, parents and even the community at large (e.g. Boninger et al., 2019; Jesionkowska, 2020; Mutch, 2012).

The challenges of adapting to technology use for teaching were multiplied and magnified in 2019, as the COVID-19 pandemic led to lengthy school shutdowns. Teachers had to pivot almost immediately from in-person to online teaching, and reports from around the world highlighted the challenges that teachers encountered during their emergency remote teaching (Hodges et al., 2020). However, these obstacles are hardly new to many researchers and practitioners who have been implementing VE in their own teaching for decades. Kern (2013) reminded readers that the practice of collaborating at a distance has been around for a century, citing Célestin Freinet establishment of the Modern School Movement in the 1920s. By 2008 (over a decade before the pandemic), the concept of knowing how to work together towards a mutual goal, including across distances, was already being touted as an essential skill for the 21st century citizen (Partnership for 21st Century Skills, 2008). In the 1990s, some researchers and practitioners were exploring the ways in which communication tools—supported by the internet—could be used to promote language learning in ways that go beyond the classroom walls (e.g. Brammerts, 1995; Johnson, 1996; Kern, 1996; Warschauer, 1995a, 1995b, 1996). Although it may seem quite obvious now that the internet is available to almost 60% of the world's population (Internet World Stats, 2021), it was still quite challenging and problematic in the mid to late 1990s and early 2000s when internet connections were not only irregular and expensive, but the tools available for communication were also "clunky" and far less user-friendly than current devices and connections.

Still, despite these challenges, language educators were quick to spot the potential of opening up the classroom through the use of communication technology, in order to mobilize resources for authentic language practice and to allow students external contact with other languages and cultures (Warschauer, 1995a, 1995b, 1996). Within a few years, authors such as Warschauer (1999), O'Dowd (2000), and Esch and Zähner (2000) were proposing that this was not only an ideal opportunity for language learning but that it was the responsibility of teachers to prepare their students for upcoming life skills in this way. Pioneers in VE (known more as telecollaboration at the time; see O'Dowd & O'Rourke, 2019) echoed Wagner's (2011) oft-cited predictions regarding essential professional competences for the (then distant) future of 2030, in particular the need to be able to work collaboratively at a distance through communication technology. VE teachers and researchers foresaw that the ability to cope personally and professionally with others online would be an essential skill for all students enrolled in primary and secondary education at the time, and publications on telecollaboration in language education making similar predictions soon followed (Davies et al., 2011; Dooly, 2008, 2010, 2015; Dooly et al., 2008; Dooly & Sadler, 2005; Guth & Helm, 2010; Müller-Hartmann, 2006).

This author can still recall the first time telling an audience in a 2011 seminar that in less than a decade, it was certain that not only would students need to know how to collaborate at a distance, they would also need to understand the sociopragmatics of blended environment meetings where some participants attended face-to-face, some online and in some cases, attendees would be through holographic images. This notion was met with scepticism (to describe it politely). However, only recently, during one week in December 2021, the author sat in a meeting held in a totally immersive environment (Virtual Reality [VR]), worked with preservice language teachers to create activities for a different immersive environment, and watched a televised interview in which the emcee discussed business policies with discussants from around the world. In this interview, three of the participants were in-person in the studio, two were visible on screens, and one was an interactive hologram. The discussion was live, not pre-recorded, so the interactions were taking place simultaneously through all these modalities.

While anecdotal, these examples corroborate early VE claims that educators must not only integrate available technology, they must also anticipate technological advances and consider how these will have an impact on pupils. It is manifest that there will be even more sophisticated communication technology in the future. There is already deep technopedagogical understanding and practice based on solid research (Lusted, 1986; Mishra & Koehler, 2006) but there is still much to be discovered. For this reason, it is important to look back at where we began and provide a brief overview of the once ground-breaking research and practice that has laid the foundations for the upswing of excellent practice in VE that is taking place today. Thus, researchers and practitioners can better identify areas where work has only just begun or perhaps remains largely unexplored. To undertake this historical perspective, the key definitions that have been associated with VE will be considered, as well as how these have impacted the evolution of practice and research in this field.

Definitions and Implicit Underlying Premises of VE

As outlined in the introduction, the rise and ease of use of communication technology has led to an increased interest in how this might be most effectively applied to language education. Most experts in VE place early publications from the 1990s as a key impulse for interest in VE by language educators. Warschauer (1995a, 1995b, 1996) referred to network-learning and virtual connections for intercultural exchanges while Little and Brammerts (1996) described tandem learning as a partnership between people with different mother tongues working together to learn each other's language and learn about each other's culture. In 2000, Kern and Warschauer published their book on network-based language teaching and in 2003, Belz used the term 'telecollaboration' to describe internationally distanced language classes using internet communication tools "to support social interaction, dialogue,

debate, and intercultural exchange" (p. 2). This seemed to be the preferred term for a little over a decade, after which Virtual Exchange became increasingly more popular. In 2016, O'Dowd and Lewis (2016) explained that telecollaboration, Virtual Exchange, and Online Intercultural Exchange are very similar in the sense that they all refer to engaging students in task-based interaction and collaborative exchange projects under the guidance of their teachers. COIL (Collaborative Online International Learning) also gained traction, in particular in North America (Guth & Rubin, 2015; Rubin 2017). Virtual Exchange is now becoming a recognized term, at least in the European Union (Dooly & Vinagre, 2021) and it is increasingly used by institutions and governmental agencies, although telecollaboration is still used by many (Colpaert, 2020). In their working paper on digital education action plan, the European Commission (2020) declared that VE can help teachers to shift from their accustomed teaching approaches in order to develop new skills and engage in linguistic, intercultural, and digital learning experiences.

Figure 1 highlights how the terminology and associated definitions have had significant impact in describing and understanding these types of exchanges. Extricating the key words used in definitions in key papers across a timeline shows a gradual evolution in the focus of the exchanges.

In the mid 1990s to the early 2000s, the principal emphasis was on connections (principally through asynchronous modalities such as emails and forums) between different language speakers. Concurrent to these exchanges, there was a focus on exposure to and exchange with individuals from other cultures (e.g., Warschauer, 1995a, 1995b, 1996). As the internet became more accessible, faster connections and new applications made synchronous (text-based) chats more feasible, and a shift towards interaction, dialogue and debate (or negotiation, both linguistic and intercultural) came to the fore (e.g., Belz, 2003; O'Dowd, 2000). With the increase in bandwidth and more advanced videoconferencing tools, the opportunities to connect groups of speakers in synchronous connections meant teachers could introduce more elaborate and longer interactions between speakers (e.g., Kinginger et al., 1999; Orsini-Jones, 2004; Ware & O'Dowd, 2008).

With the increase in synchronous, visually-enabled connections, the term Virtual Exchange (and COIL in North America) emerged. At the same time, the importance of tasks, task design and teacher guidance became more discernible, leading to a rise in calls for established models of good practice for the design, implementation and evaluation of VE in education (Dooly et al., 2008; Müller-Hartmann, 2006). In parallel, the role of the teacher (now principally as a facilitator since

Figure 1. Definitions and key terms as tracked across timeline
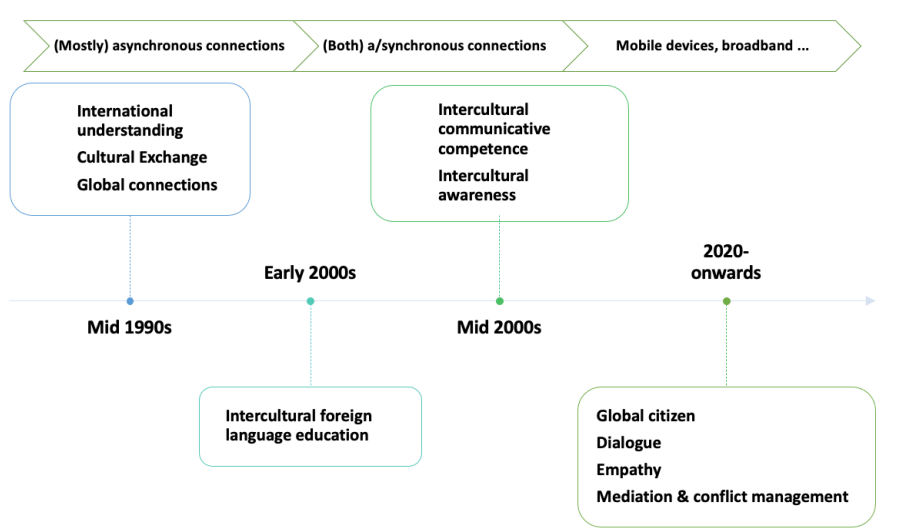
learner autonomy had also come to be considered a key feature of VE), has been foregrounded, leading to the added dimension of VE teacher education and training as a principal topic for VE research and practice (discussed in more detail below). Examples of this include two recent projects specifically focused on VE language teacher training and development: Valiant (Virtual Innovation and Support Networks for Teachers) (n.d.) and Vivexelt (Viet Nam Virtual Exchange for English Language Teaching) (n.d.). As indicated in the OECD (2021) document, knowledge on how to use VE in education is considered to be essential (hence the need for a teaching model) and moreover, it is cited as a means of educational innovation in pedagogy. Finally, the teaching of digital competences is now recurrently mentioned as conceivable learning outcomes of VE in education, in addition to the oft-cited linguistic and intercultural gains.

Until recently, the majority of VE practice has been focused on language learning although there is a growing interest in VE in education from other disciplines (Dooly & O'Dowd, 2018; O'Dowd & O'Rourke, 2019). Along with language learning, another predominant focus of VE has been intercultural gains. Figure 2 demonstrates shifts in the focus and understanding of interculturality within VE studies. Again, by drawing on the key words used in key studies across a timeline, these foci can be delineated.

VE and Intercultural Learning

Intercultural competences was a salient area of research for international exchanges from early VE practice onwards (Audras & Chanier, 2008; Belz & Müller-Hartmann, 2003; Kinginger, et al., 1999; O'Dowd, 2003; Warschauer, 1995a, 1995b, 1996). There was an overlap between a push for global competence as part of an international workforce (e.g. Partnership for 21st Century Skills, 2008; Workforce Innovation and Opportunity Act, 2014), an increment in awareness of the need for digital media literacy (Lankshear & Knobel, 2008), and a growing acceptance that language learning cannot be separated from contextualized use (Thomas et al., 2013). At the same time, new opportunities through communication technology to connect language learners and the aforementioned overlapping foci opened up intriguing possibilities for teaching and researching Intercultural Competence (IC) through VE (e.g. Orsini-Jones & Lee, 2018).

Early reports of telecollaborative projects, facilitated through expanding asynchronous connection opportunities (principally emails and forums) helped lay the groundwork for notions of VE as potentially rich sites for cultural exchange (Furstenberg et al., 2001). Cummins and

Figure 2. Key Words for IC and VE
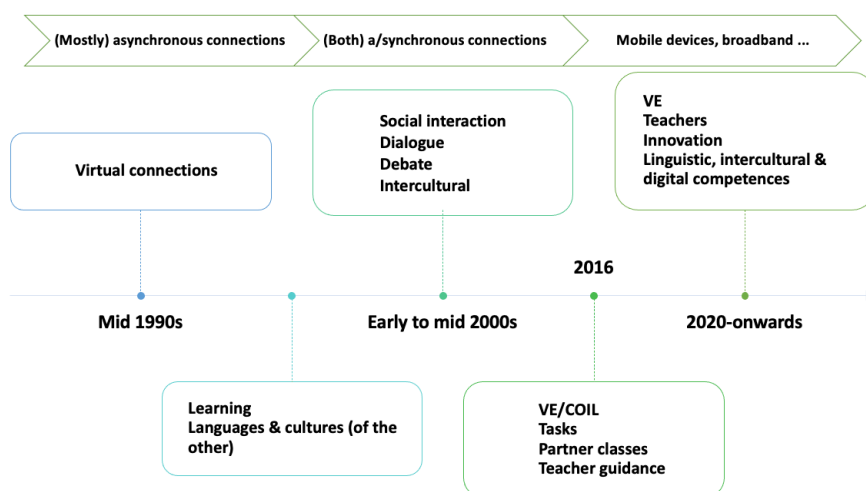
Sayers (1995) discussed the potential of global connections for breaking down cultural illiteracy and in this same year Brammerts (1995) described an international email tandem project. In 1997, Riel described a city partnership between Hamburg, Germany and Chicago, USA that promoted international understanding and cultural exchange through emails between school children in the two partner cities. In their Council of Europe (CoE) report, Korsvold and Rüschoff (1997) outlined how "teleco-operative" and "telecommunicative learning projects" (p. 13) could have an impact on "aspects of intercultural learning and related competences much needed in an increasingly globalised working environment" (p. 14). An early focus appears to be exchange between (assumed) cultures and nationalities. Publications drew from previous IC models aimed at business exchanges, probably because this was the principal social sector with more exposure (and need to understand) other cultures at the time (e.g. Chase et al., 2002).

As access to communication technology in the classroom grew, examples of VE in language education became more visible. Picking up on guidelines by the CoE (2001) in which cultural understanding and awareness is understood as part and parcel of the (foreign) language learning experience, VE publications begin to highlight these aspects as potential learner gains (Carney 2006; Chun 2011; Godwin-Jones, 2013; O'Dowd, 2003, 2006, 2007; O'Dowd & Lewis, 2016; Li, 2020). This focus has largely been constant although terms such as global citizen, empathy, mediation, dialogue, and conflict resolution are increasingly more visible in VE publications (Godwin-Jones, 2015; Golubeva & Guntersdorfer, 2020; Guntersdorfer & Golubeva, 2018; Orsini-Jones et al., 2015). Helm (2013, 2018) proposed a dialogic model for telecollaboration in which tensions between groups or individuals need not be avoided or "smoothed over," because "conflict and dissensus" are "seen as a natural social phenomenon and as a key for learning to take place" (Helm, 2013, p. 33).

More recently, as easy connections between individuals around the world have expanded even more through broadband and handheld devices, the challenges of defining, researching and assessing IC in VE have been highlighted (Godwin-Jones, 2019; Vinagre & Corral Esteban, 2019). These obstacles are compounded by the difficulties of actually defining intercultural competences and intercultural awareness, as is witnessed by the many different terms that have been used in academic discourse. Spitzberg and Changnon (2009) underscored the inherent difficulties of defining, teaching and assessing intercultural competence by pointing out that "theories and models display both considerable similarity in their broad brushstrokes (e.g., motivation, knowledge, skills, context, outcomes) and yet [there is] extensive diversity at the level of specific conceptual subcomponents" (p. 35). An additional issue is that IC development cannot be assumed to automatically take place. O'Dowd and Dooly (2020) point out that within VE, the most significant contact and optimal learning opportunities often occur outside of the moderated VE in-class time. Teachers must have the know-how to facilitate and guide the interaction, including moments of tension and dissension as appropriate "learnable moments" in the VE. It is not within the scope of this paper to discuss pedagogical strategies for this, however, fortunately there is abundant literature regarding IC in VE, including in this Special Issue. This leads to the third focal point: VE and teaching.

VE as a Teaching Methodology in Language Education

As discussed, interest and research in VE extended from small pockets of pioneering practices (e.g., Warschauer, 1995a, 1995b, 1996) to institutionally-based implementation such as COIL and the Stevens Initiative in the USA (http://www.coilconsult.com) and Erasmus+ Virtual Exchange (EVE) (Europa, n.d.) and UNIcollaboration (https://www.unicollaboration.org/) in the EU. There has therefore also been considerable effort to consolidate VE as a pedagogical methodology and to provide specific teaching models that can be applied to a variety of educational contexts (Evaluate Group, 2019; O'Dowd & O'Rourke, 2019). However, this is complicated by disagreement regarding terminology within the field of education about method, methodology, and approach. Kumaravadivelu (2001, 2003, 2006) made a distinction between established methods, which he defines as "conceptualised and constructed by experts in the field" and methodology, which is "what practicing teachers actually

do in the classroom in order to achieve their stated or unstated teaching objectives" (Kumaravadivelu, 2006, p. 84). Thornbury (2013), on the other hand, proposed that teachers do not follow methods, they "appropriate" with "an approach that accords uniquely with their 'sense of plausibility'" (Thornbury, 2013, p. 193). In many academic publications on VE, there are significantly similar theoretical foundations that are referenced as the basic conceptual paradigms for VE practices (Colpaert, 2020; Dooly & Vinagre, 2021; Thomas et al., 2013). In particular, VE is regularly seen as originating from the communicative approach to language teaching, which places emphasis on communicative competence (functional, sociolinguistic, grammatical, discourse, and strategic) and authentic and meaningful language use (versus memorization of language structures) for language learning (Brown, 2007).

VE is also regularly viewed within a student-centred, sociocultural paradigm. This shift from a "transmission mode of pedagogy" to a more "participative experience" (Thomas et al., 2013, p. 7) has been the mainstay of learning design for VE from its earliest iterations. Drawing from influential thinkers such as Vygotsky (1930-1934/1978), Wertsch (1985), and Tharp and Gallimore (1988), many publications on VE promote situated, learner-centred social practices as a key component of the learning process. The collaborative, geographically-distanced digital environment for learners to (co)construct knowledge through engagement with peers is arguably more visible in the term telecollaboration but remains a key factor for outlining VE as well (O'Dowd & O'Rourke, 2019).

There is a growing body of research that has described VE as either a pedagogical approach (e.g., Nissen & Kurek, 2020; O'Dowd & Dooly, 2022) or a pedagogical method (e.g. Hernández-Nanclares et al., 2019; Oskoz & Vinagre, 2020). Additionally, there are recent government calls for the promotion of VE teacher competences (OECD, 2021), with the implication that VE is both a teaching approach and post-methodology, as defined by Kumaravadivelu (2001). While there is inevitably a wide variety and subsequent flexibility in its application, VE has well-defined key principles that distinguish it from other pedagogical frames as outlined by Dooly and Vinagre (2021):

1. It is a highly flexible teaching approach.
2. It ensures opportunities for social interaction and collaboration with other learners outside formal classroom boundaries.
3. It can be an alternative to physical mobility for students.
4. It offers the opportunity to develop critical digital, intercultural and language competences in a digital environment.

Another unique feature of VE is that it involves partnership, not only between learners, but also between teachers, because it requires collaboratively designed and implemented tasks and activities carried out by more than one teacher in more than one class. This marks the key difference between VE and distance education courses: VE cannot function as a one-teacher per class set up, as has emerged from research on good VE teaching practice (figure 3).

The move towards establishing teaching models (Evaluate Group, 2019; Nissen & Kurek, 2020; Orsini-Jones, et al., 2018) highlights the need for more focus on VE in Teacher Education (TE). According to the European Framework for the Digital Competence of Educators (Redecker, 2017), teachers should be ready to support their students to use digital technologies for communication, collaboration, and professional development. Students should also be able to creatively and responsibly use digital technologies for information, communication, content creation, wellbeing, and problem-solving. These abilities bring to mind many of the publications about VE, even from the earliest years, in which it was argued that learners were not only learning and improving their linguistic competence, they were gaining digital and intercultural competences that would prepare them for the 21st century (e.g. Belz & Müller-Hartmann, 2003; Guth & Helm, 2010; Warschauer, 1999). Many of the pedagogical competences called for in the EU Framework (Redecker, 2017) are already included in models and guidelines for teacher competences for VE (Evaluate Group, 2019; Nissen & Kurek, 2020). Hopefully, these guidelines can lay the foundation for more integration of VE, a recognised

Figure 3. From examples of good practice towards an established VE teaching approach
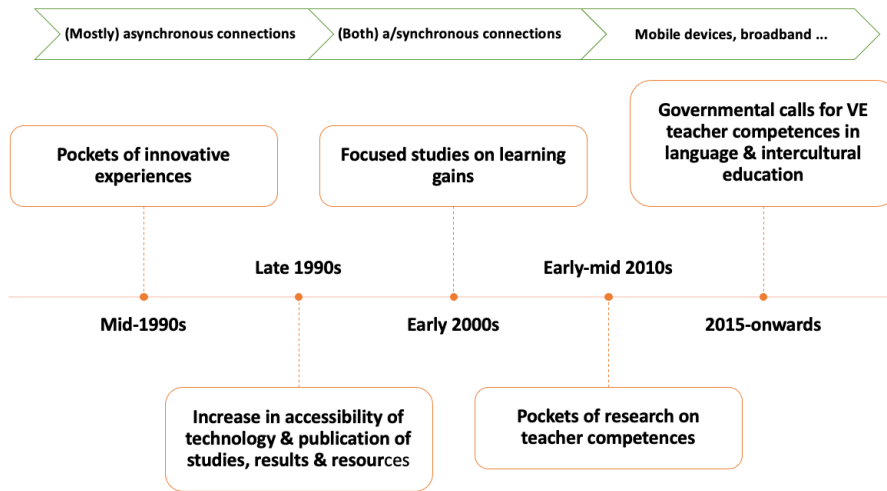
pedagogical approach into TE in higher education institutions. VE in TE can address calls in policy documents for teacher know-how in VE to help shape the global citizen (OECD, 2021).

"Soft Skills" for the 21st Century

Experienced VE practitioners understand that VE is not just about acquiring technological, linguistic, intercultural or digital competences (O'Dowd & Dooly, 2022). VE can also be associated with the so-called "soft skills" that students will need in the immediate and long-term future. These include cognitive flexibility, tolerance for ambiguity, resilience, empathy, and pro-social engagement. This section looks at each of these more closely to see how these intersect with VE.

Cognitive flexibility is described as the ability to respond to obstacles, setbacks and challenges positively and proactively; it is the capacity to think about multiple concepts simultaneously (Dajani & Uddin, 2015). For Hauck (2007), cognitive flexibility and individual tolerance for ambiguity are connected to expectation management; both of which are crucial for successful VE. Tolerance for ambiguity requires being able to exist with uncertainty and having a willingness to relinquish some control including overcoming the discomfiture of not knowing (Dervin, 2014; Guilherme, 2020). The unease that may accompany encounters in new environments and interacting with individuals who may have norms, values, and behaviours different from one's own is a common feeling for pupils first exposed to intercultural environments (Dervin, 2014). This is also a key theme in VE publications. Cognitive flexibility (seeing multiple perspectives, perhaps even from a cultural viewpoint entirely opposite one's own) can be crucial for IC development (O'Dowd & Dooly, 2020). Understanding, too, that there are no fixed truths in human interaction requires tolerance for ambiguity. Critically-reflective intercultural speakers need to be able to negotiate between their own cultural, social and political identifications and representations and those of the other, while accepting that identities are multiple, ambivalent and elastic. In our current digitalized world, this ambivalence and elasticity is magnified as learners navigate spaces more fluidly and in often disembodied ways (Darvin, 2017).

Another essential soft skill is resilience: the ability to recover from a difficult or challenging situation proactively and positively, which will be indispensable for future generations (Alden & Taylor-Kale, 2017). Similar to notions of "techno-collaborative" skills (Dooly & Thorne, 2018), this ability to overcome misunderstandings and setbacks in group endeavours is essential for successful VE. Digital communication between geographically distanced partners, in multiple languages and through multi-layered technology can render collaboration even more taxing. In this

sense, techno-collaboration is also related to awareness of individual well-being in VE. Resilience is considered essential for dealing with anxiety as well as for forming and maintaining positive, mutually-respectful relationships with others (Alden & Taylor-Kale, 2017), all of which are crucial for VE (Evaluate Group, 2019).

Resilience, tolerance for ambiguity and cognitive flexibility seem to go hand-in-hand with another soft skill considered to be fundamental for the 21st century: empathy. The ability to discern other people's emotions and sentiments is largely seen as an unquestioned component of Intercultural Competence (Golubeva & Guntersdorfer, 2020; Guntersdorfer & Golubeva, 2018). There is ample literature that discusses the basic need for regulating emotions, coping, and reacting appropriately in VE (Avgousti, 2018), which may include trying to understand and interpret the feelings of exchange partners who come from different sociocultural backgrounds and different mind-sets and life-experiences.

Finally, pro-social engagement is understood as the orientation towards the well-being of one's community (versus zero-sum individualistic behaviour). According to experts in psychology, pro-social behaviour has been related positively to the development of multiple perspective taking (Wentzel, 2013), a characteristic that overlaps with tolerance for ambiguity and cognitive flexibility. Pro-social behaviour is very similar to many of the intercultural competences for VE that have been widely discussed in the literature on IC gains (Avgousti, 2018; Oskoz & Vinagre, 2020) such as the willingness to help or share tasks and trying to understand the perspectives or feelings of others. Pro-social behaviour can also be linked to the development of empathy, and emotion regulation skills. As VE educators, it is important to have this aspect in mind when designing VE tasks (Golubeva & Guntersdorfer, 2020).

Looking Forward: Future Challenges and Possibilities for VE

In order to understand the competences that will be needed by future generations of learners, it is useful to consider the potential advances in communication technology, beginning with the transformation of channels for data exchange. Referring to upcoming versions of internet (Web 3.0 and 4.0), data engineers Weber and Rech (2010) placed emphasis on the likely increase in interaction between humans and non-human agents powered by Artificial Intelligence (AI). Apart from the developments that will emerge as AI takes over portions of the more repetitious aspects of teaching and learning processes, VE educators should consider the skills needed when interacting with non-human agents (AI driven natural-language services, virtual reality services, etc.). Individuals must know how to interact with many different beings and entities, some of them automated "beings" such as "bots," avatars, or human-assisted virtual agents. This requires being able to adapt and develop new forms of "interpersonal" (might one say inter-being?) skills and interactional abilities to collaborate with (and work alongside) humans, machines, and automated systems at the same time (Fuchs & Snyder, 2013; Knight et al., 2020).

What other factors should educators have in mind when thinking of how they can best prepare their students for the socio-political, economic, and practical requirements of the near future? Currently, it is already recognized that required digital skills range from the very basic, such as working with a common computer programme, to the highly complex, such as mastery of AI programming (OECD, 2021). However, with our growing understanding of how the Web will be AI-driven and become increasingly more prevalent in all aspects of our lives (for instance through embedded and wearable devices), teachers must begin to take these points into consideration when looking at the pedagogical competences required for VE in language education. It is difficult to predict exactly what this might look like, but it could begin with VE projects that deliberately integrate some communication tasks with human teams and non-human agents, followed by discussion and proposals on how to best deal with communication gaps and other similar challenges that emerge during the interactions. Another VE approach to AI could be to use it for the more repetitive tasks that may be required in the preparation for the online encounters. AI technology is already being used to improve communication skills in

the medical field (Ryan et al., 2019; Butow & Hoque, 2020). Similarly, AI technology might be used for individual rehearsals prior to the exchanges. This would not only increase the amount of repetition in the target language (a common goal for language classes), it can free up more time and bolster pupils' confidence for the online encounters. All seemingly futuristic, yes, but the role of educators is precisely to prepare today's learners for the future.

Future VE might look to promoting "techno-creativity," which is understood as the ability to generate and apply new ideas in technology-enhanced contexts; to see existing situations in a new way; to identify alternative explanations; and to combine existing resources to form something original (Greteman & Wojcikiewicz, 2014). While this may not seem directly linked to VE, in more recent VE publications, the notion that students must work together to create output and products falls into this domain. As VE pedagogy calls for more task-based and project-based collaborative work, this 21st century competence is coming into play and being developed by learners. Eventually, future VE projects may even integrate multiple-user immersive VR sites. These environments have been shown to optimize learner creativity (Jimeno-Morenilla et al., 2016) and its potential for VE learning is thought-provoking.

Educators also need to help learners understand how power operates within and through online and digital structures and cultures, which may be summarised as "techno-ethic awareness" (Dooly & Thorne, 2018). Bringing critical orientation to these ethical issues draws attention to how users, tools, and contexts interact in ways that can legitimize specific knowledge and behaviour, while delegitimizing other behaviours and norms (Darvin, 2017). Learners must learn to critique how digital practices and norms have an impact both on and offline. For instance, it has been found that AI-generated testing may reproduce bias (AI-hiring programmes have been found to discriminate against women; see Dastin, 2018). So, if VE practitioners make the integration of AI-generated interactions into their project design explicit to their learners, they can use this opportunity to open debate regarding algorithm-driven norms that can influence public opinion.

This dovetails into the notion of data literacy: knowing how to manage digital data and understanding the consequences and permanence of data gathering, data generating, and data sharing. Data literacy is now often included in education curriculums, but VE educators should also interrogate their own practices and ask themselves about the types of behaviour they are modelling in their VE practice. Examples of this include sensitivity to identity issues, careful collection and storage of student data and output, and the demonstration of responsible digital interactions. Recently there has also been a growing concern for promoting critical digital literacy, which includes understanding how the different channels of communication may have a bearing on human perceptions, feelings, values and even how we "know" things (Elola & Oskoz, 2017). Reporting on a VE that used videoconferencing with preservice language teachers, Kern (2013) stressed the ways in which technologies mediate our digital interactions and in turn, can shape the way identities are performed and interpreted. In his study, he demonstrated that videoconferencing can give the impression of immediacy, which introduces ambiguity in the way physical proximity is interpreted. As technology advances so that communication becomes more AI-generated and more immersive, VE practitioners can be in the forefront of understanding and improving communication, building on the IC educational foundations they already have.

A More Immediate Future

VE practitioners and researchers should embrace the ambiguous and accept the discomfort of the unknown. The need for cognitive flexibility, resilience and tolerance of ambiguity is equally valid for educators. In many cases, "VE teachers are often unprepared for the 'grey' areas that emerge from these 'authentic' exchanges" (Dooly & Vinagre, 2021, p. 9). In particular, teachers will often try to downplay tensions and conflicts that may arise, rather than embracing these moments as opportunities for dialogue and reflection (Helm, 2018). This can be done by designing and including VE activities for improving listening skills (related to empathy) and activities that teach how to de-escalate moments

of tension (related to cognitive flexibility and tolerance for ambiguity). There should also be scheduled time for dialogue, reflection based on teachable moments when tensions or conflict do arise.

There is also always a need for more investigation into technological tools. VE practitioners and researchers should collaboratively explore the impact of the communication tools they use with their students and partner teachers. VE teachers often assume that the technology chosen for VE is neutral, especially if they like experimenting with technology as most VE practitioners do. However, teachers need to be aware and make their students aware of how the very technology they are using will have an impact on how they perceive the other and how others perceive them. At the same time, teachers should not frighten students away from technology. There is already a growing "digital divide" that is creating a new schism in educational opportunities among some communities of learners (Epstein, et al., 2011; OECD, 2021). Students cannot afford to be left behind when it comes to discovering, adapting, and using technology creatively.

VE practitioners and researchers can use VE to promote more pro-social behaviour. Many VE models mention the need for ice-breaking activities at the beginning of an exchange (Dooly, 2008; Dooly, et al., 2008; Fuchs & Snyder, 2013; Guth & Helm, 2010; Hauck, 2007; Orsini-Jones & Lee, 2018). Some include follow-up sessions that encourage learners to discuss what they have learnt from others and to show their appreciation of the collaborative work carried about by their partners. Some models also explain the need to negotiate and clearly lay out ground rules for community-building (Dooly, 2008; Orsini-Jones & Lee, 2018; Dooly & O'Dowd, 2018; Kurek & Müller-Hartmann, 2017; O'Dowd, 2020). Ultimately, VE educators should try to integrate the notion of pro-social behaviour in the design of all tasks (Godwin-Jones, 2015; OECD, 2021). They need to consider whether the learning activities promote kindness or empathy rather than competitiveness, foster inclusivity, integrate mediation and negotiation into all the activities carried out, and explicitly foster empathy through specific activities or sessions.

Finally, the VE community should also strive to carry out more collaborative practitioner research (including interdisciplinary studies and exploratory work with AI and other emergent technologies). Teachers in primary and secondary education are among the most numerous practitioners of VE but are not necessarily researching or publishing on their experiences. The VE community of researchers should make an explicit effort to include their voices in the dissemination of VE practice. Not only will this help promote VE as a teaching approach by speaking directly to the education community; it is, arguably, the ethical way to go.

In less than a quarter of a century, VE has moved from pockets of innovative practice to become a leading area of inquiry and development in computer assisted language learning (Colpaert, 2022), so much so that institutional documents are now making the call for integration of VE competences in teacher education (OECD, 2021). The next quarter of a century will most certainly bring exciting new perspectives to VE as researchers and practitioners move to expand on technological, theoretical, and pedagogical foundations and aim to achieve a balanced adaptation of the upcoming technological advances. Teachers, researcher and learners need to be open and ready for the opportunities and challenges in VE.

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CONFLICT OF INTEREST

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