

The Multifaceted Field of Virtual Exchanges in Teacher Education: A Literature Review

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∞ Virtual exchanges can be seen as a powerful tool in fostering digital-pedagogical, intercultural, and foreign language competences in teacher education. Since the Covid-19 pandemic in 2020, virtual exchanges in teacher education have gained increasing attention both in research and practice. Despite a growing number of publications and various fields and themes covered by research and reports, few publications are concerned with connecting and systematising the discourse on virtual exchanges between 2020-2023. This paper, thus, aims to offer a comprehensive overview of how virtual exchanges are employed in teacher education by adopting a scoping study approach and examining research papers published in this period of time. Our findings cover the planning, implementation, and evaluation of virtual exchanges, as well as some overarching recommendations for improving the delivery of virtual exchanges in teacher education as they are provided in the research papers. Virtual exchanges in teacher education are a multifaceted field since it has multiple aims, usages, and impacts, which largely depend on the (mostly voluntary) work of teacher educators, the institutional framework within which the exchanges take place, and student teachers' motivation to participate. The future of virtual exchanges in teacher education would benefit by opening up beyond foreign language teacher education and combining small-scale with large-scale studies to better inform research and practice.

Keywords: internationalisation, literature review, teacher education, professional development, virtual exchange

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Večplastno področje virtualnih izmenjav v izobraževanju učiteljev: pregled literature

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∞ Virtualne izmenjave lahko obravnavamo kot močno orodje za spodbujanje digitalno-pedagoških, medkulturnih in tujejezikovnih kompetenc v izobraževanju učiteljev. Od pandemije covid-19 leta 2020 so virtualne izmenjave v izobraževanju učiteljev deležne vse večje pozornosti v raziskavah in praksi. Kljub naraščajočemu številu publikacij ter različnim področjem in temam, ki jih zajemajo raziskave in poročila, se le malo publikacij ukvarja s povezovanjem in sistematizacijo diskurza o virtualnih izmenjavah v obdobju 2020–2023. Namen tega prispevka je ponuditi celovit pregled uporabe virtualnih izmenjav v izobraževanju učiteljev, in sicer s pristopom študije obsega in pregledom raziskovalnih člankov, objavljenih v tem obdobju. Naše ugotovitve zajemajo načrtovanje, izvajanje in vrednotenje virtualnih izmenjav ter nekatera osrednja priporočila za izboljšanje izvajanja virtualnih izmenjav v izobraževanju učiteljev, kot so navedena v raziskovalnih člankih. Virtualne izmenjave v izobraževanju učiteljev so večplastno področje, saj imajo več ciljev, uporab in učinkov, ki so v veliki meri odvisni od (večinoma prostovoljnega) dela izobraževalcev učiteljev, institucionalnega okvira, v katerem izmenjave potekajo, in motivacije študentov, bodočih učiteljev, za sodelovanje. Za prihodnost virtualnih izmenjav v izobraževanju učiteljev bi bilo koristno, če bi se jih razširilo še na druga področja zunaj izobraževanja učiteljev tujih jezikov in združilo manjše študije z obsežnimi, da bi bolje informirale raziskave in prakso.

Ključne besede: internacionalizacija, pregled literature, izobraževanje učiteljev, profesionalni razvoj, virtualna izmenjava

Introduction

Virtual exchanges (VEs) in teacher education (TE) carry great potential. They can enhance student teachers' (STs) professional development, support the internationalisation strategy of TE institutions, and promote digital transformations in TE. VE-related research emerged in the early 1990s and found a growing interest towards the beginning of the 2000s in higher education (O'Dowd, 2023, pp. 23–24). In recent years, there has been an even greater interest in VE in both practice and research (for higher education, see Jager et al. (2021), Dovrat, 2022, p. 194, Barbosa and Ferreira-Lopes, 2023; O'Dowd, 2023; for TE, see Hauck et al., 2020, p. 5). Dovrat (2022, p. 195) even speaks of an 'explosion in VE course development and research', which could be traced back to the outbreak of the Covid-19 pandemic and the shift to online teaching (Jager et al., 2021, p. 25). To date, research in VE covers a broad field of academic disciplines and topics. Or, as the Stevens Initiative puts it: 'Virtual exchange is viewed as an innovative and new pedagogical technique that is being implemented across a variety of academic fields' (Stevens Initiative, 2020a, p. 5).

The use of VE in TE is not novel, and TE seems to be understood as a fundamental and transversal theme in VE literature (Barbosa & Ferreira-Lopes, 2023, p. 574). Nevertheless, a limited number of papers present a comprehensive overview of the field of VE in education (Stevens Initiatives, 2020). As a result, certain challenges arise: 'Few resources describe this research landscape holistically, so practitioners and scholars can be isolated from other research and findings' (Stevens Initiative, 2020a, p. 3).³ Since 2020, various literature reviews have been published, for example, in the field of higher education by Dovrat (2022) or Barbosa and Ferreira-Lopes (2023). These reviews report on literature published before 2020 and are not specific to TE.

In the field of TE, the anthology of Hauck and Müller-Hartmann (2020) offers insights into the multifaceted field of research and practice of VE. In the field of language TE, Wu (2021, 2022) published two systematic reviews on how telecollaboration is used in language TE. The former publication is concerned with themes inherent to the integration of telecollaboration in language TE and focuses on outcomes from 2009 to 2019. The latter publication refers to methodologies and pedagogical applications that were used in language TE from 2010 to 2020.

3 For an overview of literature reviews published before 2020, see Barbosa & Ferreira-Lopes, 2023, p. 559; Dovrat (2022, p. 195); Wu (2022, pp. 282–283); for more recent publications that are not literature reviews but take a broader stance on VE, see Dooly and Vinagre (2022), Hagley and Wang (2020); Helm and Beaven (2020); Jager et al. (2021); O'Dowd (2023); Stevens Initiative (2020a); UNICollaboration (2023)).

We can thus argue that little has been covered by literature reviews in TE for the period between 2020 and 2023, following the outbreak of the pandemic and the surge of VE-related literature. Moreover, the few reviews that currently exist tend to be framed within a language TE context, overlooking the potential of VE for general TE across various disciplines. Against this background, the present study aims to provide a comprehensive review of the literature on the field of VE in TE at large, considering studies that have been developed in the three years since the outbreak of the pandemic (2020–2023). In doing so, we aim to inform contemporary discourses about the role of VE in TE and, specifically, the way that VE can be planned, implemented, and evaluated in the context of TE.

Virtual exchange and teacher education: a conceptual clarification

In the following, we outline our understanding of VE and TE. VE may also be referred to as telecollaboration, cooperative online international learning (COIL) or teletandem, to name just a few terms (for an overview, see Dooly and Vinagre, 2022, pp. 392–394; O’Dowd, 2023, pp. 8–10). These terms are occasionally used interchangeably but can sometimes refer to a specific approach. Thus, the Stevens Initiative (2020a, pp. 4–5) suggests the need for standardised terminology. In our paper, we use O’Dowd’s commonly employed definition of VE. According to O’Dowd (2023),

[VE] is an umbrella term which refers to the numerous online learning initiatives and methodologies which engage learners in sustained online collaborative learning and interaction with partners from different cultural backgrounds as part of their study programmes and under the guidance of teachers or trained facilitators. (p. 11)

Crucial to VE is that learners collaborate online with other learners from another cultural background during a higher education course. In the context of TE, this collaboration implies that STs engage in an online learning occasion with STs from different cultural backgrounds. In O’Dowd’s definition, it remains open whether these are synchronous (e.g., video conferencing) or asynchronous encounters (e.g., e-mail exchanges). Another definition, provided by the EVOLVE (Evidence-Validated Online Learning through Virtual Exchange; 2020) project, proves to be quite similar but adds that ‘interaction takes place between individuals or groups who are geographically separated and/or from different cultural backgrounds.’ These complementary definitions

are useful for the purposes of our study since they help us to conceptualise VE in a broad way that includes multiple ways of communication and takes place across different nations; specifically, the VE involves two or more countries.

In this paper, we focus on VE in initial TE, which is a central part of initial teacher preparation (see OECD, 2019). According to the OECD (2019), initial teacher preparation includes ‘pre-service education and preparation during the first year of teaching’ (p. 18). Our focus lies on initial TE programs, meaning formal teacher education that leads to a diploma or degree that is needed for teaching in public schools. We do not distinguish between various courses, degrees, or educational levels. The term ‘ST’ is used to refer to students at a higher education institution who follow courses to become teachers. They are not yet fully qualified. The first phase of TE often comprises practical training, subject-related studies, subject-related didactics, and educational science. However, TE may vary across different countries, and even within countries, various forms of TE can be found (Symeonidis, 2021). Despite this variety, VE in TE seems to be structured in ways similar to those of the EVALUATE Group (Evaluating and upscaling telecollaborative teacher education; Evaluate Group, 2019, p. 2) states. Roughly speaking, the VE is initiated and organised by teacher educators, including curriculum and task designs and assessments. During the VE, the STs collaborate, ‘discussing issues related to their curricula and collaborating to create educational materials and activities’ (EVALUATE Group, 2019, p. 2). Throughout the exchange, the STs’ learning process is supported. In the context of TE, VE is commonly used to support STs’ professional development in various fields. For instance, to develop teaching skills, including digital teaching skills, the improvement of subject-specific skills, such as foreign language learning and teaching or intercultural learning. Some VEs are also organised as a form of practical training.

Our research process is guided by the five-stage framework proposed by Arksey and O’Malley (2005). We commenced by *identifying the research question (stage one)*: How is VE being employed in TE, according to research papers published from 2020-2023? Considering that any intervention includes different stages before it produces concrete outcomes, we focused on the stages of planning, implementation, and evaluation. To refine our analysis, we thus formulated three complementary research questions:

1. How is VE in TE being planned and implemented?
2. How is VE in TE being evaluated?
3. Which overarching recommendations for improvement are provided by the authors of the publications?

Method

To provide a comprehensive overview of the role of VE in TE spanning from 2020 to 2023, we draw on the scoping study method outlined by Arksey and O'Malley (2005). To improve the reporting quality of our study, we also applied the PRISMA Extension for Scoping Reviews' checklist (see Tricco et al., 2018). A scoping study is a type of literature review.⁴ It 'can be undertaken as stand-alone projects in their own right, especially where an area is complex or has not been reviewed comprehensively before' (Mays et al., 2001, p. 194). As outlined before, this is the case in the field of VE in TE.

Sample

To *identify the relevant studies (stage two)*, meaning to gather data, we selected the electronic databases Academic Search Premier ($n=3$), Education Source Ultimate ($n=16$) and Education Resources Information Center (ERIC; $n=29$). In the electronic databases, we applied the following keyword string: 'virtual exchange' or 'virtual exchanges' or 'telecollaboration' or 'telecollaborative' or 'COIL' and 'teacher education' or 'teacher training' or 'pre-service'. We used VE as it is an established umbrella term; we also added 'telecollaboration' and 'COIL' as these two terms are also frequently used to relate to VE (see O'Dowd, 2023, pp. 8–11; Barbosa & Ferreira-Lopes, 2023, p. 570). For TE, we did not use 'teacher preparation' as this term proved not specific to TE. Additionally, hand-searching was applied for the Journal of Virtual Exchange (UNICollaboration; $n=35$) due to its relevance and despite not being included in the selected databases.

To identify relevant data, we focused our search on peer-reviewed, empirical, and original research papers published in journals and written in the English language. We explicitly chose peer-reviewed and original papers listed in professional electronic databases to ensure the quality of the research papers, as the scoping study method does not evaluate the quality of research done in the field (see also Arksey and O'Malley, 2005, pp. 21–22). We focus on papers published between March 2020 and August 2023. As mentioned above, to our

4 Arksey and O'Malley (2005) state that there are many different types of literature reviews. They explicitly differentiate between a systematic literature review and a scoping: 'First, a systematic review might typically focus on a well-defined question where appropriate study designs can be identified in advance, whilst a scoping study tends to address broader topics where many different study designs might be applicable. Second, the systematic review aims to provide answers to questions from a relatively narrow range of quality assessed studies, whilst a scoping study is less likely to seek to address very specific research questions nor, consequently, to assess the quality of included studies' (p. 20).

knowledge, two literature reviews have been published by Wu (2021, 2022) on how telecollaboration is used in language TE for this specific period of time. Additionally, since the beginning of the worldwide Covid-19 pandemic in 2020, VEs seemed to gain a greater attention (Jager et al., 2021, p. 25; for a more general reflection on education during the pandemic see Pešikan et al. 2021).

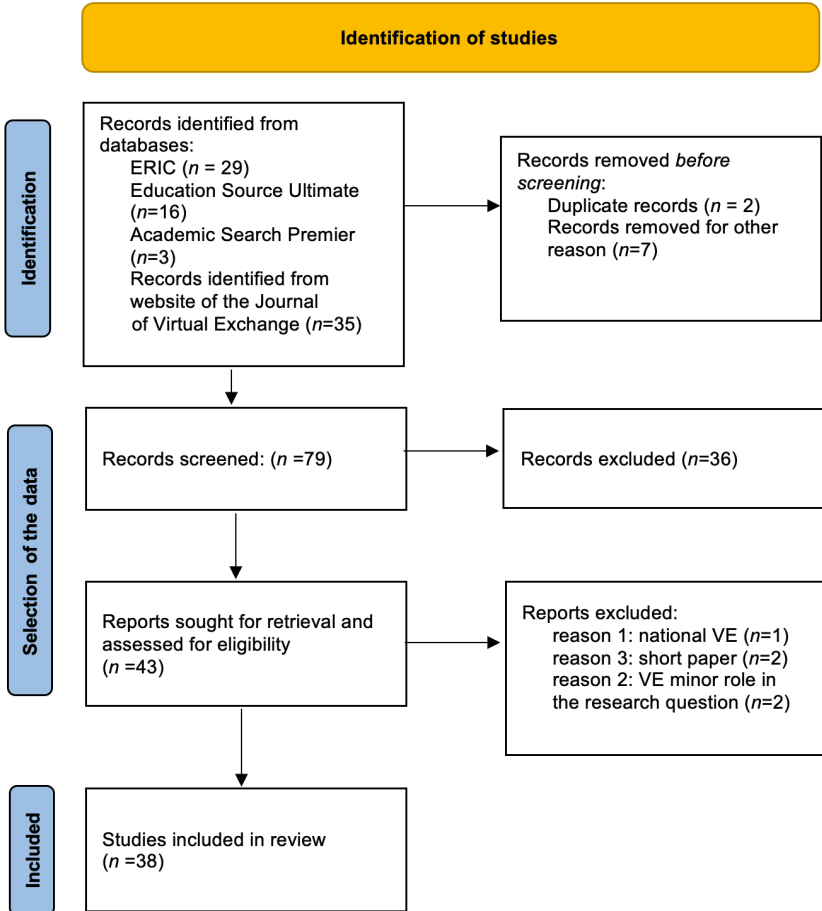
In total, we retrieved 88 publications. We subsequently proceeded *to select the studies (stage three)*. Specifically, we selected the data as follows: having excluded doubled research papers ($n=2$), practice reports and papers which were published in a language other than English ($n=7$), we read through the titles and abstracts of all papers and excluded papers that did not meet our aforementioned definition of VE and TE ($n=36$). Papers that discussed, for instance, tele-tandems, in-service-teacher education, or teacher educator's professional development were excluded. We read through 43 papers and excluded five more research papers for the following reasons: one research paper reported on a VE on a national level. In two research papers, the VE played a minor role; for example, it was just a small part of a greater research question, and too little information was offered for our analysis. Two research papers were short papers and offered (due to their nature) too little information about the contexts and empirical data. In the end, we selected 38 papers, which we included in our data analysis. In Figure 1, we summarise our process of selecting the studies by using the PRISMA 2020 flow diagram.

Data analysis

Our refined research questions helped us in *charting the data (stage four)*. We decided to use a descriptive and analytical systematisation based on our research questions. We then *collated, summarised*, and developed a systematisation to *report* our results (*stage five*). We chose a thematic analysis to present our findings on the implementation and evaluation of VE and the overarching recommendations provided by the authors. We used software for qualitative data analysis (MAXQDA). Following our three research questions, we coded the research papers employing both inductive and deductive reasoning, specifically developing codes from the data and from theoretical concepts and models. As the development of the systematisation is specific to each research question and closely related to our findings, we will explain them at the beginning of each section of the following chapter.

Figure 1

PRISMA 2020 flow diagram



Results

Planning and implementation of virtual exchange in teacher education

To answer our first research question about how VE is planned and implemented in TE, a combined inductive and deductive reasoning process helped to discern the following aspects: establishing the partnership for the VE; integrating the VE in the TE curriculum; designing the tasks for the STs;

utilising technology; defining the role of teacher educators; and evaluating STs' performance. Some of these aspects have previously been identified by the EVALUATE Group (2019) and O'Dowd (2023) as the necessary steps to carry out a VE in TE.

Before undertaking the VE, *establishing a partnership* is crucial to helping teacher educators agree and plan their work. Partnerships are commonly established between teacher educators (rather than their institutions) in two different countries, who either have previously become acquainted with each other or have found each other through VE finder tools. Institutions might provide support in implementing the VE (e.g., allowing integration in the curriculum), but often, teacher educators undertake such activity themselves on a voluntary basis or in the context of a funded (research) project. The duration of the VE is usually designed to last six weeks, with some studies reporting a minimum of three weeks (Jaramillo Cherrez & Gleason, 2022; Gleason & Jaramillo Cherrez, 2021) and others lasting a 16-week semester (Dietrich, 2022). A commonly cited challenge is aligning the course calendars in the different institutions, which is not always possible, so some institutions limit their synchronous interactions to a few meetings. In cases in which the partnership was well established and uninterrupted for years, meetings would take place regularly over the semester (Dooly & Sadler, 2020). The number of STs participating in the VE has also differed between the partners (e.g., 37 STs in one partner and 14 in the other Dooly & Sadler, 2020), although a balance was generally sought.

A crucial issue in the process of planning is *the integration of the VE into the TE curriculum*. We observe that only on a few occasions has a joint curriculum been developed by the partners, culminating in the development of a new jointly offered course, even if it is not officially named as such (e.g., Dooly & Sadler, 2020). In most cases, teacher educators attempt to integrate the VE as an add-on to an already existing course. The mode of STs' participation in the VE (i.e., compulsory or voluntary) differed among studies, while sometimes it differed even among partners conducting the same VE together. In the study of Bilki et al. (2023), for example, one university introduced the VE as an extra-curricular activity in which STs could voluntarily participate, while the partner university made participation in the VE a course requirement. When VE is a required component of the course, it is also evaluated as part of STs' course grades and STs are offered ECTS credits. However, in the study of Jørgensen et al. (2022), the VE was integrated into existing modules of TE programs in both partner countries but was formally assessed only in one of them, leading some of the participants to think that the absence of assessment had reduced their motivation.

Designing the tasks for STs is also a key aspect of the successful implementation of the VE. Across the examined studies, the tasks were designed as collaborative activities including STs from different cultural backgrounds and often included the development of a joint product as the final output (e.g., Garcia-Esteban et al., 2021; Rets et al., 2023; Symeonidis & Impedovo, 2023). The tasks were often designed to develop STs' subject-specific and teaching competences (mostly foreign language teaching), while some tasks also focused on STs' values and attitudes as teachers, as will be detailed in the following section. The nature of the tasks varied across studies, but several studies integrated tasks particularly relevant for TE, such as the design of lesson plans (Garcia-Esteban, 2020; Hilliker & Yol, 2022; Rets et al., 2023), the delivery of 'mini-lessons' for classmates (Dooley & Sadler, 2020), the development of a learning journal (Gleason & Jaramillo Cherez, 2021; Hilliker, 2020; Madden, 2022; Yang, 2020a), and video recording for reflection of STs' teaching methodologies (Hilliker, 2020; Hilliker et al., 2021; Lenkaitis, 2020; Lenkaitis et al., 2020). The tasks often required STs to undertake some research (e.g., Garcia-Esteban, 2020) and fostered the comparison and analysis of cultural practices and teaching philosophies (Hilliker & Yol, 2022; Lenkaitis, 2020; Rets et al., 2023; Symeonidis & Impedovo, 2023).

To implement the VE, teacher educators rely heavily on *the use of technology*. For synchronous communication, most studies refer to Zoom as the preferred videoconferencing platform (with Skype, WhatsApp and Facebook/Messenger also mentioned), while for asynchronous communication, several platforms were utilised, including Moodle, Edmodo, TEAMMATES, Blackboard, and Google Docs. The vast majority of studies included a combination of synchronous and asynchronous means of communication, with emphasis given to student-led synchronous meetings as more motivating and immersive for STs. In a few VEs, teacher educators opted for a predominantly asynchronous mode of communication (Orsini-Jones et al., 2020; Üzüüm et al., 2020; Üzüüm et al., 2022). Despite teacher educators planning for the technology to be used, some studies indicated that STs often chose their own way of communication with each other, which helped to overcome communication difficulties and implied that teacher educators had to show flexibility (e.g., Symeonidis & Impedovo, 2023). The use of technology is essential for the VE, but it is not always a given. For example, Dietrich (2022) reports on the challenges of participants in conflict-affected societies, such as Afghanistan, who did not have internet at home and had to travel to access computers at educational centres.

The role of teacher educators as initiators of the VE and mentors of STs is also discussed across studies. Specifically, teacher educators often adopt the

role of facilitator rather than instructor during the VE, introducing STs to their tasks, providing them with explanations when needed and generally supporting STs' communication with each other. Teacher educators tend to promote STs' self-directed learning and autonomy (e.g., Dooly & Sadler, 2020). However, in a few studies, teacher educators appear to maintain the control they normally exert and fail to draw on the online practices of their students, leading to a mismatch between teacher educators' and STs' goals (Jørgensen et al., 2022).

Finally, *evaluating STs' performance* largely depends on whether the VE was offered as a voluntary or compulsory activity. In studies reporting the VE as a voluntary activity, there was no formal assessment and STs' received no ECTS (e.g., Rienties et al., 2022). When VE was a required course component, then active participation in the VE (Dooly, 2022), written reflections (Gleason & Jaramillo Cherez, 2021; Hassan et al., 2021; Üzümlü et al., 2020), and/or the final STs' joint product (Symeonidis & Impedovo, 2023) were considered as part of STs' final course evaluation. Several studies also connected STs' evaluation with an official evaluation of the VE, gathering STs' written reflections, surveys, and materials as evidence for the impact of the VE.

Evaluation of virtual exchange in teacher education

How is VE in TE evaluated? To answer this second research question, we start by offering a descriptive overview of research strategies. We then turn to the results, which can be grouped into two categories: either the authors focus on approaches developed for the VE in TE or they concentrate on STs' professional development.

Our literature review revealed that *research on VE* in TE includes mostly qualitative studies that adopt a (primarily descriptive) case study research design. Ethnography, grounded theory, and design-based research are also research designs that some of the studies adopt to evaluate the impact of VEs or to help design an intervention and analyse its results. Three studies include a mixed-methods approach, and only one report undertaking a large-scale quantitative study. Although VEs include international cooperation among TE institutions in different countries, a comparative research perspective is only mentioned in three of the examined studies, indicating that comparative studies, paradoxically, hold a marginal role in this field of research. An explanation for overlooking the comparative dimension could lie in the fact that these small-scale studies tend to consider VE participants as a homogeneous group of learners who participate in the same experience without always acknowledging the rather diverse socio-cultural background of different learner groups,

which would imply an in-depth examination of STs' TE contexts. Of course, there are also a few studies focusing on intercultural learning, which advise taking STs' prior knowledge, personal interests, and socio-cultural background into consideration (e.g. Rienties et al., 2022; Yang, 2020b).

The small-scale nature of these studies is also becoming apparent when these studies choose to include only a part and not all of the exchange partners as research participants for reasons that have to do with 'practicalities' and 'data protection laws'. Like previous studies examining the impact of VEs in TE (e.g., EVALUATE Group, 2019; Rienties et al., 2022), we could also observe that there are few evidence-based and large-scale studies with a well-argued choice of variables. One should not overlook the practical value that research for TE has for those directly involved in it, namely teacher educators and STs (Symeonidis, 2024). Our study shows that, in the vast majority of the examined studies, the teacher educators who initiated the VE are also the researchers who evaluate the outcomes of their work. As such, most of the studies could be characterised as self-study, implying that researchers also reflect, for instance, on their own professional learning or ways of knowledge generation. However, this involvement in both research and practice is not always clearly documented and reflected upon on a methodological level.

Most of the examined studies focus solely on foreign language TE, with only six studies exploring the potential of VEs to develop STs' knowledge, skills, and attitudes in other subjects. Recurring themes of study include (a) the impact of VEs on developing (foreign language) STs' content knowledge, pedagogical content knowledge (especially technological), and pedagogical knowledge; (b) the impact of VEs on developing (foreign language) STs' professional attitudes and skills, (e.g., intercultural competence, critical reflection, democratic attitude); and factors influencing the design process of VEs (particularly task development). To explore these topics, the authors employ research methods commonly used in qualitative research, such as (individual and/or group) interviews, surveys with open-ended questions, reflective journals or essays, portfolios, written evaluations, email communication, and video recordings, while some studies report utilising quantitative surveys. The data analysis consequently includes a form of content analysis (e.g., Mayring's qualitative content analysis), thematic analysis, discourse analysis for qualitative data and statistical analysis for quantitative survey data.

The *results* of the VE in TE are reported commonly, either with a focus on STs' professional development or a specific approach. Many authors concentrate on STs' development. However, some authors also present a specific way of implementing a VE in TE. Before we outline the results concerning

STs' professional development, we will briefly describe the specific approaches adopted by the authors. We use the term 'approach' as an umbrella term to refer to a specific way of obtaining a goal. Where the authors used a more specific terminology, we refer to it. Overall, we can categorise the approaches as follows:

Predominantly, approaches revolve around the promotion of *specific attitudes and/or values*. Bartsch et al. (2021) assess how consumer and sustainability goals can be developed. Their approach seems to be beneficial for developing consumer and sustainability competences. Rauschert and Cardetti (2022) construct a teaching concept on democratic competences and align it with principles of intercultural citizenship education. They positively evaluate it, stating that 'students successfully engaged in intercultural dialogue, addressed local and global issues and used their creative writing skills to promote democratic values as well as to raise awareness of biased perspectives' (Rauschert & Cardetti, 2022, p. 38). Symeonidis and Impedovo (2023) also provide a positive evaluation of their approach, which aims to foster STs' professional awareness as European teachers.

A *critical approach* is adopted by Gleason and Jaramillo Cherrez (2021) and by Jaramillo Cherrez and Gleason (2022). They employ a critical cosmopolitan framework for (one and the same) VE, which is reflected through different perspectives in both research papers. Furthermore, we identified two approaches which stand out as *they combine VE with other learning formats*. Dooly and Sadler (2020) demonstrate the potential of an approach that they call 'FIT', which stands for flipped materials, in-class instruction, and telecollaboration. It aims to promote learner responsibility or dialogic learning. Orsini-Jones et al. (2020) analyse a project called 'Blending Massive Open Online Courses in English Teacher Education with Telecollaboration' (BMELETET). As the acronym suggests, the authors combine a VE with MOOCS. Apparently, this project supports STs' use of technology in their teaching and increases digital critical literacy development.

Researchers evaluating *STs' professional development* present a wide array of results. To structure the results, we used the COACTIV Model of Teachers' Professional Competence⁵ by Baumert and Kunter (2013) as a heuristic. According to the COACTIV model, professional knowledge comprises (drawing back on Shulman's approach to structure teachers' knowledge) pedagogical

5 The COACTIV model is an empirically and theoretically tested concept of professionalism; it is a generic model used by the authors in international comparative research and is specialized to teachers' professional competence in mathematics. The acronym COACTIV stands for 'Cognitive Activation in the mathematics classroom and professional competence of teachers'.

knowledge, content knowledge and pedagogical content knowledge. Organisational knowledge and counselling knowledge are added. Furthermore, Baumert and Kunter (2013) point out that beliefs, values, goals, motivational orientation and self-regulation are also relevant to teachers' professional competence. We expanded and refined this model to provide a systematic overview of the findings. For instance, results pertaining to pedagogical content knowledge all referred to (foreign) language learning and teaching, as revealed during our analysis. To group the findings with the utmost precision, we opted to use the latter term to categorise these findings. TPACK (Technological Pedagogical Content Knowledge) is another example. It encompasses several knowledge forms and plays a crucial role in evaluating VEs. Thus, we introduced this category as a separate one. For similar reasons, we established intercultural communicative competences, interactions, and transversal competences as further categories. Organisational knowledge, counselling knowledge and self-regulation are not evaluated separately by the authors. Consequently, these knowledge forms could not be covered in our systematisation. In the following, we focus on the main results reported in the papers, specifically, the answer to the research question provided by the authors.

VE can be beneficial for the development of *TPACK*, as demonstrated by Hauck et al. (2020) and Rets et al. (2023). However, Rienties et al. (2022) illustrate that STs who participated in the VE did not seem to gain greater *TPACK* skills than the students who participated in the control group. However, if the students already possessed greater *TPACK* skills before they participated in the VE, this appeared to positively influence the acquisition of their foreign language (Rienties et al., 2022, p. 577).

The results of four other papers can be linked to *TPACK*. Hassan et al. (2021) illustrate how STs engage in a VE with undergraduate language students. Dietrich (2022) details gains in 'teaching online' (Dietrich, 2022, p. 34). Yang (2020a) also describes the benefits of STs' development with regard to digital literacy skills. Bilki et al. (2023) refer to critical digital literacy and provide an illustration of how this term is conceptualised in the context of a VE in TE.

Foreign language teaching and (foreign) language learning are often intertwined. For instance, Hilliker (2020) describes a study in which STs learn about linguistics in an English as a second language/English as a foreign language course and apply their knowledge in a VE with students who want to learn English. Similarly, Hilliker and Yol (2022), Hilliker et al. (2021) and Lenkaitis et al. (2020) report on positive results from combining (foreign) language learning with foreign language teaching, specifically applying subject and pedagogical knowledge in teaching practice in the form of a VE. Wach et al. (2022) and Yang

(2020a) focus on foreign language teaching and Yang (2020b) describes foreign language learning.

Beliefs, values and motivational orientation are individually evaluated in some papers. STs can become aware of stereotypes (Hilliker, 2020), develop their professional ethos (Hassan et al., 2021) or acquire more favourable self-perceptions (Viáfara González, 2020). Yang (2020b) describes STs growing confidence and motivation for using a foreign language, while Wach et al. (2022) highlight that STs valued the VE and were ready to integrate into their future career.

The development of *intercultural communicative competence (ICC)* is assessed by Yang (2020a) and Üzüm et al. (2020). Eren (2023a, 2023b) also analyses positive results for ICC development; the former focuses on positive results for the STs' identity orientation, and in the latter, Eren centres on STs' critical cultural awareness. Although the following authors do not explicitly mention ICC, their findings can be integrated here. For instance, Yang (2020b) describes improved intercultural competence. The study of Dietrich (2022) shows that STs learned more about the foreign country and acknowledged as well as valued cultural differences.

Interactions in VEs are also subject to evaluation, for example, by Drixler (2022) who describes foreign language interactional competences used in the VE, these comprise 'multilingual and epistemic resources as well as the organisation of turn-taking' (p. 85). Furthermore, mediations between participants and a teacher are examined by Fuchs et al. (2022), and translingual negotiations are analysed by Üzüm et al. (2022). From their analysis of intercultural learning moves, Sardegna and Dugartsyrenova (2021) developed successful combinations of discussion questions that increased the students teachers' intercultural learning..

Transversal competences and themes describe results that take a more holistic perspective on STs' professional competence and tend to be less subject specific. Kopish and Marques (2020) illustrate the potential of VE centred on promoting global competences and the use of technology for learning. Pu and Weng (2023) evaluate global teaching competences, and Madden (2022) reports on the development of 'glocal' competence. The influence of the pandemic on ST's perceptions as well as their development of 21st century skills are assessed by Hilliker and Loranc (2022). STs' agency for social justice is assessed by Üzüm et al. (2022). Garcia-Esteban (2020) illustrates the development of Sustainability Development Goals and how these may enhance civic competences. Lenkaitis (2020a, 2020b) examines STs' reflections on their professional development.

Overarching recommendations for implementing virtual exchange in teacher education

The following recommendations stem from the authors of the research papers. Overall, they express a positive disposition towards VEs. Many of them suggest conducting a VE in TE, even though these endeavours might pose challenges at times. As our aim is to provide practical guidance, we include only recommendations that are more general and can be transferred to other VEs. This entails reporting recommendations that authors themselves identify as broader or if authors across various research papers offer similar advice.

Authors recommend *preparation* from various perspectives: educators should consider various factors before initiating a VE. STs should be adequately prepared, for instance, regarding their expectations towards the VE (Rets et al., 2023), as well as addressing sensitive issues that may arise during the VE (Madden, 2022). Teacher educators should be prepared for different STs' competences and related challenges as this helps to provide suitable strategies. Additionally, it is helpful to know STs' interests to relate to suitable tasks (Yang, 2020b), while the specific needs and interests of STs could be taken into consideration for the preparation (Rets et al., 2023). Another part of the course preparation could be that students are provided with time to become acquainted with each other, for example, through ice-breaking methods, as Eren (2023a) suggests. Furthermore, Viáfara González (2020) observed that STs found it easier to initiate the VE by chatting rather than video calling. In addition, assessment and credits for the workload completed by the students should be considered and should be similar for all participants (Bartsch et al., 2021; Madden, 2022).

Recommendations regarding the *time* and *planning* of a VE are also provided. Different time zones or term schedules should be accounted for when scheduling synchronous encounters (Yang, 2020a). Different time zones might also be influential on the choice of synchronous or asynchronous communication. Üzümlü et al. (2020) propose planning for a duration of two semesters, provided the groups remain the same. Furthermore, planning, conducting, organising, and evaluating a VE can be time intensive. Thus, it is essential to allocate sufficient time for the entire VE project (Gleason & Jaramillo Cherez, 2021; Jaramillo Cherez & Gleason, 2022), which should include teacher educators' workload and semester breaks (Eren, 2023a).

Support for *communication* among students is also necessary. Drixler (2022) recommends addressing interactional strategies that students could employ for the first meeting, for example, presenting their surroundings via webcam. If the STs communicate in a foreign language, they should be encouraged

to adhere to it. Bartsch et al. (2021, p. 66) suggest integrating language learning and subject-matter learning, particularly if the VE is not part of a foreign language course. To facilitate group discussions, Üzümlü et al. (2020) propose the existence of facilitators. Sardegna and Dugartsyrenova (2021) provide guidelines for discussion questions aimed at intercultural learning. Rets et al. (2023, p. 1239) advise 'explicit discussions of home group organisation and the implications of task work'.

Discussion and conclusions

A plethora of research studies employing VE in TE has been published in recent years, while an acceleration in the production of such studies can be witnessed following the outbreak of the Covid-19 pandemic. Our study set out to explore the way that VE is employed in TE-related literature between 2020 and 2023, focusing on its planning, implementation, and evaluation, as well as recommendations for improvement. We could generally argue that VE in TE appears to be a multifaceted field since it has multiple aims, usages and impact, which largely depend on the (mostly voluntary) work of teacher educators, the institutional framework within which the VE takes place, and STs' motivation to participate.

With regard to planning and implementation, we agree with the EVALUATE Group's (2019) stages of carrying out a VE in TE, although it becomes clear that developing a joint curriculum for the exchange beyond what is already stipulated in the existing TE curriculum, proves challenging and time intensive. As a result, teacher educators tend to integrate the VE as an add-on in existing courses without being able to ensure the sustainability of the exchange component in that way. Nevertheless, teacher educators' resourcefulness and learning persistence can lead them to innovative and sustainable solutions, shifting the VE from the periphery to the centre of the learning process by engaging the participating institutions to officially recognise the specific teaching approach (Dooly & Sadler, 2020). VE cannot be an isolated experience, so its integration into TE programmes is necessary to move beyond a mere add-on approach.

Our findings also indicate that the successful implementation of the VE in TE requires the establishment of a functioning partnership in advance. The design of tasks should include themes relevant to TE, focusing on the achievement of learning outcomes that not only relate to STs' content knowledge and pedagogical content knowledge but also to STs' pedagogical knowledge and professional attitudes. This would imply that TE is not limited to foreign language teaching but expands to other TE components (Symeonidis & Impedovo,

2023). It would also imply that VE in TE adopts a more critical approach which considers cultural practices and perspectives, addressing social and political issues in an increasingly polarised world (O'Dowd, 2021), in view of developing teacher agency for inclusion and social justice. To engage STs' active participation in the VE, collaborative tasks, a synchronous mode of communication, and flexibility on the side of teacher educators are important. A combination of intrinsic and extrinsic motivation is needed, meaning that STs should be receiving recognition (e.g., ECTS) for their work.

The evaluation of VE in TE highlights its successful implementation, although it becomes clear that more large-scale studies about impact are needed to inform both research and practice. VE in TE may support STs' professional development regarding TPACK, (foreign) language learning and teaching, or ICC. As our review of the evaluation shows, authors also assess interactions, motivational orientations, beliefs, values, and transversal competences such as democratic competences, global competences, or civic competences. Firstly, these findings show that a broad range of approaches and results concerning STs' professional development continues to be established in various fields of TE. O'Dowd (2016) observes similar trends, which are confirmed by Barbosa and Ferreira-Lopes (2023) a few years later. Secondly, what Dovrat (2022, p. 205) states for higher education also seems to be true for TE: 'The VE field has moved beyond asking if VE works as a pedagogy to asking which learning approaches best deliver the desired student outcomes'. Large-scale assessments could be helpful in defining the most effective learning approach. It could also be interesting to examine how a carefully designed approach (e.g., aiming at global competences) might be developed 'around the globe' in various TE contexts. Thirdly, even though the pandemic seemed to serve as a catalyst for the research and practice of VEs in TE, it is rarely addressed in the research papers. There is only one publication, by Hilliker and Loranc (2022), that considers the influence of the pandemic on STs' perceptions. It is probably too early to expect broad research results, as research and publishing can be time-intensive. However, it would be valuable for researchers and practitioners alike to gain a better understanding of the possible influences of the pandemic on planning, implementing, and evaluating VE in TE. Particularly, longitudinal studies would be needed to trace possible developments over time, for example, before, during, and after the pandemic.

More up-to-date evaluations can also help to shed light on VE in TE. As our findings suggest, organisational knowledge, counselling knowledge or self-regulation are rarely addressed separately. Evaluations of institutional or political framings – including higher education institutions' internationalisation

strategies – have rarely come into view over the past three years. One reason for this might be that even though the pandemic served as a catalyst for VE in higher education, ‘actions for implementing VE on a more structural basis are still in a pioneering, experimental stage in several institutions’ (Jager et al., 2021, p. 24). Explorative studies in this field might help to integrate VE in TE with a solid, long-term perspective.

Despite these general conclusions on the evaluation, a more detailed comparison amongst the various results might be challenging. This is due to the sometimes confusing way of referring to VEs and their often highly context-specific implementations. Our literature review focuses on providing an overview of VEs in TE from 2020 to 2023. Thus, we focus on general and rather broad aspects of VE, specifically planning, implementation and evaluation of VE general recommendations as they are presented by the authors of the research papers. Future research could consider a more finely grained and comparative approach, for example, to compare various lengths of a VE project with regard to achieved results in various national contexts of teacher education systems. It could be interesting to understand how the broader aspects of VEs in TE are recontextualised in specific countries and across various cultural backgrounds.

More general recommendations are also echoed in publications concerning higher education. For instance, the significance of students’ preparation before a VE or allocating enough time for a VE is also advocated (amongst other recommendations) in the Stevens’ Initiative annual reports (2020b, pp. 11–12; 2023, pp. 20–21).

Our literature review has two main limitations: Firstly, the scoping study method does not evaluate the quality of publications. We attempted to ensure the high quality of the research publications by selecting peer-reviewed and original research listed in professional electronic databases. Secondly, we did not include research papers published in languages other than English, potentially missing out on national discourses. We also want to underscore the relevance of literature not covered in our review, such as studies before 2020, contributions in anthologies or practical reports. However, our literature review showcases how VE in TE can be planned, implemented, and evaluated, providing overarching recommendations. A major strength lies in its general overview of the field concerning the planning and implementation, evaluation, and overarching recommendations of VE in TE from 2020 to 2023. Due to its general perspective, it may encourage communication and cooperation between researchers and practitioners engaged in the growing field of VE in TE.

Disclosure statement

The authors have no conflict of interest to declare.

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