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Pre-service teachers' perspectives on virtual exchange in early language education[1]

Perspectivas de los futuros docentes sobre el intercambio virtual en la enseñanza temprana de idiomas

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Abstract:
Virtual exchange (VE) is a didactic approach in which students who are geographically separated communicate with each other in a common foreign language (FL) using technology. Its benefits have been shown in the development of language proficiency, ICT skills and intercultural competence. Although technology became an inevitable part of education during the pandemic, research shows that VE is not common in teacher education and consequently is not regularly used with primary students. The aim of the present study was to gain an insight into the views and experiences of pre-service primary and pre-primary teachers (N=501) with the use of VE activities in early FL education. Data were collected from different European contexts, with a focus on Spain,

Resumen:
El intercambio virtual (IV) es un enfoque didáctico en el que alumnado separado geográficamente se comunica entre sí en una lengua extranjera común utilizando la tecnología. Sus beneficios se han demostrado en el desarrollo de la competencia lingüística, las habilidades TIC y la competencia intercultural. Aunque la tecnología se convirtió en una parte inevitable de la educación durante la pandemia, las investigaciones muestran que el IV no es habitual en la formación del profesorado y, por lo tanto, no se utiliza habitualmente con alumnado de primaria. El presente estudio tuvo como objetivo analizar las opiniones y experiencias de profesorado en formación de primaria y preescolar (N=501) con el uso de actividades de IV en la enseñanza temprana de len-

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Poland, Slovenia and Germany, using a questionnaire with closed and open-ended questions. A quantitative research design was used, and the data were analyzed using both descriptive and inferential statistical techniques. The study showed that the participants had very limited experience and opportunities for training in VE. However, most of them expressed a positive attitude towards the inclusion of VE into primary education and would like to incorporate it into their lessons, provided they are supported in doing so. Participants emphasized the need for guidance in planning VE exchanges with young students whose language proficiency is still low. The results of the study indicate that if VE is to be present in the primary classrooms, it should be an integral part of teacher education.

Key words:
Early language teaching; pre-service teachers; primary education; virtual exchange; transnational teacher education.

guas extranjeras. Los datos se recopilaron en cuatro contextos docentes diferentes España, Polonia, Eslovenia y Alemania, mediante un cuestionario con preguntas cerradas y abiertas. Se utilizó un enfoque de investigación cuantitativa, empleando además procedimientos estadísticos descriptivos e inferenciales. Los resultados evidenciaron que los y las participantes poseían una experiencia muy limitada y disponían de escasas oportunidades de formación en este ámbito. Sin embargo, la mayoría del profesorado expresó una actitud positiva hacia la inclusión del IV en la educación primaria, manifestando además el deseo de incorporarlo a sus clases, siempre que se le apoye para hacerlo. Se destacó la necesidad de orientación para planificar proyectos de IV con alumnado de edades tempranas cuyo dominio del idioma aún es bajo. Los resultados del estudio indican que, si se quiere introducir el IV en las aulas de primaria, este debe formar parte integral de la formación del profesorado.

Palabras clave:
Enseñanza temprana de idiomas; profesores en formación; educación primaria; intercambio virtual; formación transnacional del profesorado.

Resumé:
L'échange virtuel (EV) est une approche didactique dans laquelle des étudiants géographiquement éloignés communiquent entre eux dans une langue étrangère commune à l'aide des technologies numériques. Ses bénéfices ont été démontrés dans le développement des compétences linguistiques, des compétences en technologies de l'information et de la communication (TIC) ainsi que de la compétence interculturelle. Bien que la technologie soit devenue une composante incontournable de l'éducation pendant la pandémie, les recherches montrent que l'EV demeure peu présent dans la formation des enseignants et, par conséquent, n'est pas régulièrement utilisé avec les élèves du primaire. L'objectif de la présente étude était de mieux comprendre les points de vue et les expériences d'enseignants stagiaires du primaire et du préscolaire (N = 501) concernant l'utilisation d'activités d'EV dans l'enseignement précoce des langues étrangères. Les données ont été recueillies dans différents contextes européens, avec un accent particulier sur l'Espagne, la Pologne, la Slovénie et l'Allemagne, au moyen d'un questionnaire comportant des questions fermées et ouvertes. Une approche de recherche quantitative a été adoptée, faisant appel à des procédures statistiques à la fois descriptives et inférentielles. L'étude a montré que les participants disposaient d'une expérience très limitée de l'EV et de peu d'occasions de se former dans ce domaine. Toutefois, la plupart d'entre eux ont exprimé une attitude positive à l'égard de l'intégration de l'EV dans l'enseignement primaire et souhaiteraient l'incorporer dans leurs cours, à condition de bénéficier d'un accompagnement adéquat. Ils ont souligné la nécessité d'être guidés

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dans la planification d'EV avec de jeunes apprenants dont le niveau de compétence linguistique demeure encore faible.
Les résultats de l'étude indiquent que, si l'EV doit trouver sa place dans les classes du primaire, il doit constituer une composante à part entière de la formation des enseignants.

Mots-clés:
Enseignement précoce des langues; enseignants en formation; enseignement primaire; échange virtuel; formation transnationale des enseignants.

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Introduction

In the age of digitalization and globalization, virtual exchange (VE) is now one of the key tools supporting the development of language and intercultural competencies in education. VE is a pedagogical approach to FL teaching (Dooly & O'Dowd, 2018; Dooly & Vinagre, 2022; Godwin-Jones, 2019; O'Dowd, 2021) in which students from different countries learning the same FL connect with peers for cultural exchange, as well as to carry out joint language tasks and projects via digital technology in synchronous and asynchronous modes.

The achievement of the positive outcomes of VE previously mentioned depends largely on teachers, whose role is crucial in the design, implementation, and facilitation of VE activities. Consequently, understanding teachers' perceptions and identifying their needs when planning and implementing VE initiatives is essential for ensuring their successful integration into educational practice. Although existing research has explored teachers' perceptions and needs to some extent, this attention has focused primarily on secondary education contexts and has often relied on the qualitative analysis of relatively small samples. By drawing on a large-scale sample of preschool and primary pre-service language teachers (N = 501), this study extends previous research and contributes to a more comprehensive understanding of the factors that influence the adoption and sustainability of VE in educational settings, particularly among (foreign) language teachers.

Literature review: Virtual Exchange in English Language Teacher Education

Over the past 15 years, research has highlighted the importance of incorporating VE into Initial Teacher Education (ITE), particularly given future teachers' relatively low participation in physical international mobility, such as study abroad (Brzosko-Barratt et al., 2025; The EVALUATE Group, 2019). Consequently, VE has served as an accessible form of internationalisation, enabling pre-service teachers to collaborate with global peers through both synchronous and asynchronous interaction (Dooly & Sadler, 2013; Sadler & Dooly, 2022). VE has been shown to generate considerable engagement among pre-service teachers, who viewed the VE experience as meaningful for their professional development. In a large-scale study involving over 1,000 participants who took part in VE during their ITE, 76% considered VE directly pertinent to their future teaching careers (The EVALUATE Group, 2019).

Much of the research on VE in ITE has focused on the competences developed through pre-service teachers' participation in VE. The literature has highlighted three areas that appear to benefit from involvement in VE: intercultural, linguistic, and digital competences (Asensio Pastor & Al-Momani, 2025; Godwin-Jones, 2019; O'Dowd, 2007; The EVALUATE Group, 2019). Engagement in intercultural interactions with peers from diverse cultural backgrounds has contributed to participants' development of greater flexibility and a deeper awareness of cultural complexity (Pennock-Speck & Clavel-Arroitia, 2022; Pieczka, 2021). VE has also been shown to support FL development by providing opportunities for authentic and meaningful communication, increasing vocabulary, and strengthening language confidence (Dooly & Vinagre, 2022; The EVALUATE Group, 2019). Participation in VE has required pre-service teachers to select and integrate digital tools for interaction, collaborative learning, and task design, moving beyond basic technical proficiency towards more purposeful pedagogical use of technology (Bennett & Wigham, 2024; Bueno-Alastuey & Kleban, 2016). Additionally, research examining pre-service teachers' participation in VE has pointed to the development of both reflective and teaching skills (Lenkaitis, 2020; Loranc et al., 2024). Studies have indicated that, by being involved in VE activities, pre-service teachers broadened their perspectives on FL instruction and increased their

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awareness of diverse contexts of language teaching and individual learner differences.

Given the numerous benefits associated with VE, one might expect it to be widely adopted by teacher education institutions. However, its implementation remains uneven, largely due to varying levels of institutional support and limited opportunities for teacher training. In the specific context of eTwinning, one of the most widely used platforms for organizing VE projects, the 2023 report on the impact of eTwinning on pre-service teacher education (European Commission; European Education and Culture Executive Agency, 2023) noted that the integration of VE projects into teacher education programs varied considerably and depended on the specific characteristics of individual educational institutions. The report provided examples of integrating the eTwinning program into bachelor's, master's, and postgraduate programs, particularly in the fields of English language studies and teacher education at the preschool, elementary, and secondary levels. These initiatives were implemented as part of academic courses, such as methodology courses or teaching practice. Furthermore, the report underscored the difficulties arising from institutional and organizational challenges. The most frequently cited factors included lack of time, lack of integration into the curriculum, and underdeveloped networks of cooperation with teachers and schools. It also pointed out issues related to the perception of eTwinning as a teaching tool used in school or academic practice, and less often as a subject of scientific research.

In addition to the institutional and organizational factors discussed above, successful VE implementation depends heavily on the quality of teacher preparation (Dooly & Sadler, 2013; Sadler & Dooly, 2022) and on teachers' prior experiences of participating in VE during their teacher education programs (Dooly & Vinagre, 2022; Sadler & Dooly, 2016; The EVALUATE Group, 2019). Research further suggests that teacher education should incorporate both theoretical and practical components, as well as opportunities for critical reflection on students' own experiences and teaching practices (Dooly & Sadler, 2013; Sadler & Dooly, 2022; Wigham & Clavel-Arroitia, 2025). Furthermore, teacher education programmes should take into consideration factors such as the subject areas pre-service teachers are expected to teach and the needs of their future pupils (Dagarin Fojkar et al., 2026). This is relevant because the majority of research on VE has focused predominantly on post-secondary edu-

cation (e.g., Pennock-Speck & Clavel-Arroitia, 2022; Weiss et al., 2026; Wigham & Clavel-Arroitia, 2025). Although a smaller body of research has examined VE in early language learning, existing studies suggest that VE can also foster young learners' motivation to learn FLs (Okumura, 2020) and support their speaking development (Cutrim Schmid & Whyte, 2015; Dagarin Fojkar et al., 2026; Kim, 2020).

Despite the crucial role of training on VE among teachers, relatively little is known about their educational and professional development needs, particularly those of language teachers working in primary schools in VE. A notable exception is Wigham & Clavel-Arroitia's study (2025), which showed that primary school language teachers perceive numerous difficulties associated with the use of VE in FL lessons. These include limitations related to students' language proficiency, reading and writing skills, and speaking ability, since activities undertaken within VE often focus on oral communication. Furthermore, there are concerns regarding students' lack of digital literacy. Teachers also pointed out difficulties related to the pedagogical integration of digital applications and the design of tasks tailored to students' language proficiency levels. Formulating instructional objectives for activities carried out as part of the VE project also proved challenging for teachers. Additional difficulties arose during the project's initial phase, including finding an appropriate time slot in the school's schedule to facilitate the exchange. The need to align curriculum content with task design in the virtual environment was also emphasized, which often entailed various organizational challenges (Wigham & Clavel-Arroitia, 2025).

The literature review thus far reveals a series of gaps. Specifically, most research on VE experiences in pre-primary and primary education contexts has relied primarily on qualitative research methodologies and relatively small sample sizes. Furthermore, limited attention has been paid to pre-service teachers preparing to work with young learners in preschool and primary school settings. The current study addresses this gap by investigating the perceptions and perceived preparedness of a large sample of 501 preschool and primary pre-service language teachers. In doing so, it responds to the need for research focused on teacher education for professionals working with very young and young language learners, a group whose educational needs differ significantly from those of older students. There are three main research questions that this study seeks to explore:

RQ1: What are the participants' perceptions about and experiences with using VE at pre-primary and primary level?
RQ2: How do participants assess their competences related to VE and which challenges do they foresee in conducting VE projects?
RQ3: What are the participants' needs and intentions in implementing VE at primary and pre-primary level?

Methodology

Participants

A non-probability convenience sampling strategy was employed. The sample comprised 501 pre-service teachers from different European and other countries; 52 participants from Germany, 64 from Poland, 99 from Slovenia, 179 from Spain, seven from the United Kingdom and eight from other countries (two from the Czech Republic, two from China, and one each from Brasil, Japan, Denmark, and Iraq). A further 92 participants did not report their nationality. The majority of participants were female (88.7%), while 7.5% were male and 3.8% preferred not to disclose their gender. In terms of study programmes, most participants were enrolled in Primary Education with English (41.1%), followed by Pre-school Education (19.5%), Primary Education (18%), English Language and Literature (5.8%) and Pre-school Education with English (4.8%). Some participants (11.8%) were enrolled in two study programmes, such as Pre-school Education and Primary Education. Regarding year of study, 43.3% of participants were in their fourth year, 23.4% in their second year, 15.3% in their third year, 11% in their fifth year, and 7% in their first year. The participants' mean age was 21 years.

Data collection

The study formed part of a needs analysis aimed at examining pre-service teachers' perceptions and experiences of using VE in early FL education. Data were collected through an online survey questionnaire combining quantitative items with open-ended questions. The questionnaire comprised five sections addressing (1) participants' understanding of VE, (2) their previous experiences with VE, (3) competences required for imple-

menting VE, (4) their perceived needs for using VE in early FL education, and (5) demographic characteristics. The questionnaire contained 27 items, including dichotomous, multiple-choice, Likert-scale, numerical, and open-ended questions.

The questionnaire was developed for the purposes of needs analysis and was supported by the existing literature on VE, early FL education, and teacher competences. To establish content validity, the first version of the questionnaire was reviewed by 13 international experts with expertise in VE, early FL learning and teaching and teacher education. The experts assessed the items in terms of their relevance, clarity and appropriateness for the target population. Based on their feedback, some items were added to the questionnaire, and a few were reworded. The revised questionnaire was then piloted with 34 pre-service teachers. The pilot test was used to identify potential problems regarding the wording, structure, response possibilities and approximate completion time. Based on the pilot participants' feedback, some minor changes were made to improve clarity. Internal consistency of the questionnaire varied slightly across the scales, with Cronbach's alpha averaging $\alpha = .74$. Nevertheless, the 10-item numerical scale assessing participants' self-assessed competence in implementing VE showed excellent internal consistency (Cronbach's $\alpha = .92$).

The questionnaire was administered online using a survey platform provided by the University of Ljubljana. It was presented exclusively in English for several reasons. First, the target population consisted of pre-service language teachers, for whom English was relevant to their field of study. Second, VE typically requires communication through a shared FL. Third, administering the questionnaire in a single language avoided potential semantic differences that could arise through translation, and reduced logistical complexity, cost, and time.

As the researchers anticipated that some participants might not be familiar with VE as a pedagogical approach, a short description was provided at the beginning of the questionnaire in order to avoid misinterpretation. Participation was voluntary, and participants were informed about the purpose of the study at the beginning of the questionnaire.

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Data Analysis

Quantitative data were analyzed using IBM SPSS Statistics. The analysis included descriptive statistics and non-parametric inferential tests. Specifically, the Mann–Whitney U test was used to examine differences between two independent groups, the Friedman test to assess differences across three or more related samples, and the Kruskal–Wallis H test to examine differences between three or more independent groups.

Open-ended responses were analyzed using an inductive qualitative content analysis approach (Elo et al., 2014). No coding categories were established before the analysis, so the categories were derived from the participants' responses. The researchers first looked at the responses and grouped them according to their meaning. These groupings were then developed into coding categories, which were then used to classify the responses for the quantitative analysis. To ensure the credibility of the process, three researchers independently coded the responses. Afterwards, their coding was compared, and discrepancies were discussed and resolved collaboratively. The process was repeated to ensure consistency of the analysis.

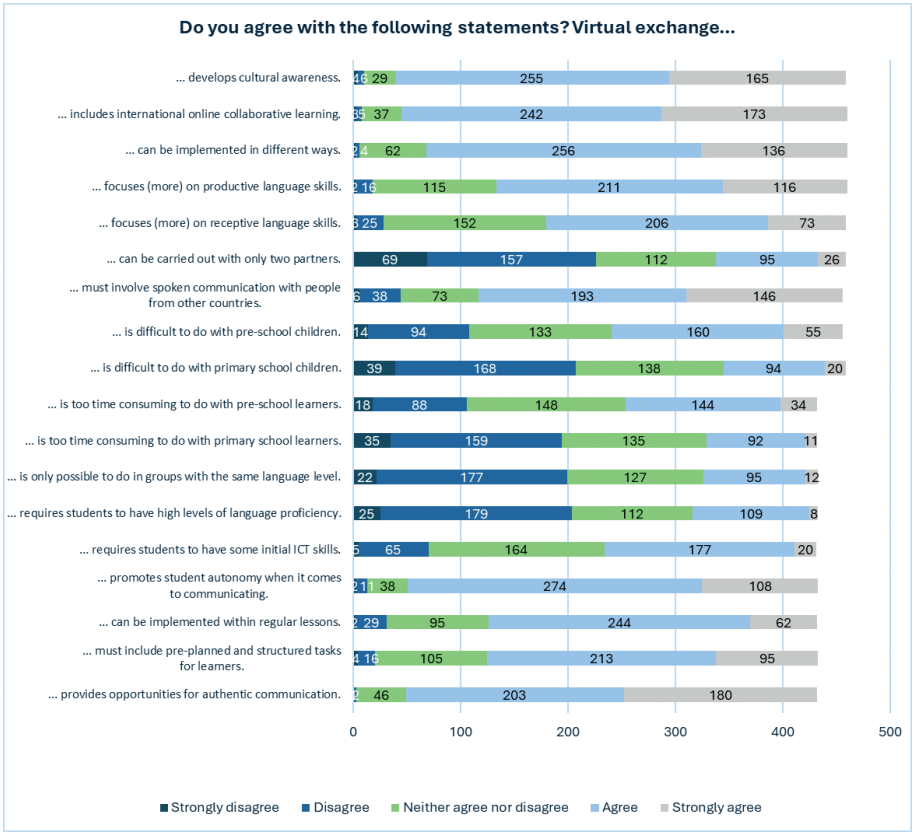
Findings

Participants' Perceptions of VE at Primary and Pre-primary Level

Study participants were asked to express their views on the introduction of VE into primary and pre-primary education on a five-level Likert scale (strongly disagree - disagree - neither agree nor disagree - agree - strongly agree).

Figure 1

Participants' views on VE in early FL learning



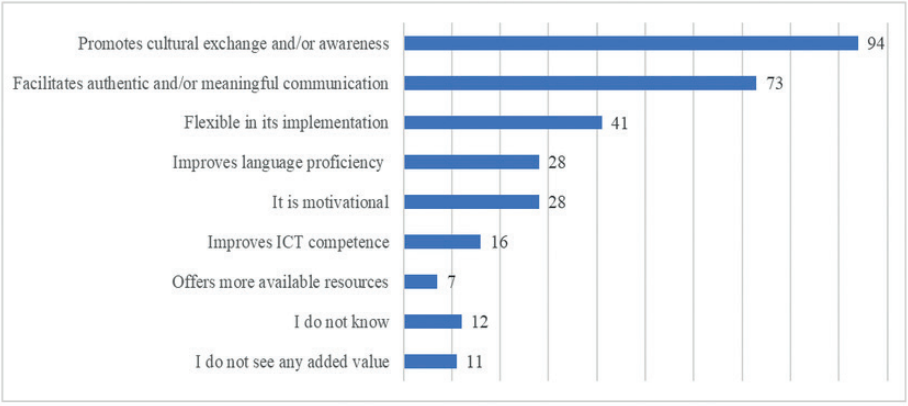
As shown in Figure 1, participants most strongly agreed with the statements that 'VE develops cultural awareness', 'promotes student autonomy when it comes to communication', 'can be implemented in many ways' and that it 'provides opportunities for authentic communication'. On the other hand, they mostly disagreed with the statements that 'VE can be carried out with only two partners', 'is difficult or too time consuming to do with primary school children', 'is only possible to do in groups with the same language level' and 'requires students to have high levels of language proficiency'.

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Added Value of VE Compared to In-person Teaching

This open-ended question asked participants to describe their perceptions of the added value of VE compared to in-person teaching. Nine categories were identified in their responses, as illustrated in Figure 2.

Figure 2
Participants' perceptions of the added value of VE



After observing that respondents most frequently identified "cultural exchange and awareness" (94 responses; 30.3%) as the primary advantage of VE compared to face-to-face education, which was followed by "authentic and meaningful communication" (73 responses; 23.5%), we examined whether exposure to VE in tertiary education curricula (either through learning about it or direct participation) influenced students' perceptions of its added value. However, chi-square tests revealed no statistically significant differences between the subgroups.

Further analysis showed there were not many differences among the countries regarding the added value of VE. German participants perceived the added value of VE mainly in its role of facilitating authentic and/or meaningful communication (39.4%), closely followed by its promotion of cultural exchange and/or awareness (30.3%). Polish participants emphasized its capacity in developing cultural exchange and/or awareness (29.3%), and the second most selected value was the flexible form of its implementation (24.4%). Slovenian students valued its opportunity for cultural exchange (31.6%), meaningful communication (26.3%) and flexible implementation (14.5%). Spanish participants similarly appre-

ciated the role of VE in providing cultural exchange (28.1%), authentic communication (23.7%), and its motivational factor (12.6%).

Participants' Experiences with VE During Their Studies

In order to obtain data that would give the researchers an insight into how VE is represented in the university curricula, participants were asked whether they had learnt about VE as part of their study programme or whether they had participated in a VE project. If they responded affirmatively, they were offered a follow-up open-ended question, in which they could provide more context and detail about their VE learning or participation.

Figure 3
Participants learning about VE as part of their study programme

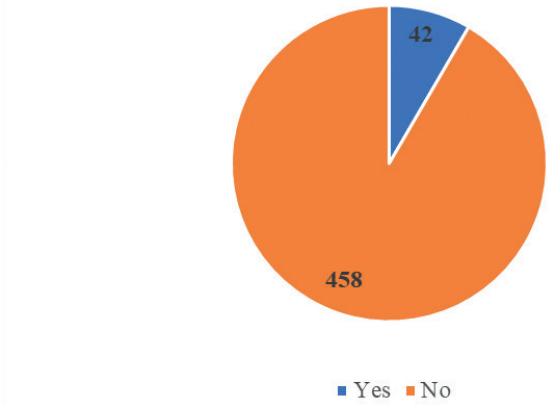
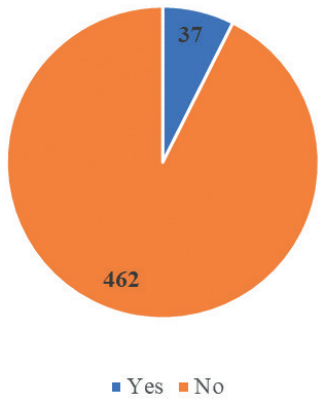


Figure 4
Participants taking part in a VE project as part of their study programme



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As shown in Figures 3 and 4, only a small proportion of participants reported having learned about VE (8.4%), and similarly few had participated in a VE project during their studies (7.4%). Cross-country comparisons revealed that Germany had a relatively higher proportion of participants familiar with VE (23.8%), whereas Spain reported the lowest (2.9%). A similar pattern emerged for participation: Slovenian students reported the highest level of experience through projects or courses (15.3%), while Spain again had the lowest proportion (3.4%). In the open-ended responses, participants clarified that their experiences were primarily linked to English Language Teaching Methodology modules, eTwinning projects and to courses in natural and social sciences in which VE projects were incorporated.

Self-reported Competences Related to VE

To assess how competent participants felt about different areas of implementing VE projects at the primary and pre-primary levels, they rated their competence on a scale from 1 (not competent at all) to 10 (very competent). We designated this construct as *self-assessed VE competence*. Its ten component numerical scales yielded a Cronbach's alpha coefficient of .92, indicating high internal consistency and a strong level of reliability.

Table 1
Participants' self-reported competences related to VE implementation

Competence	Valid N	Mode	Mean	Mean Rank
Finding partners	419	5	5.56	3.66
Communicating with partners	419	8	7.06	6.00
Finding content	418	8	6.76	5.53
Designing tasks that develop students' linguistic competence	418	8	6.48	4.91
Designing tasks that develop students' sociocritical competence	419	7	6.30	4.55
Designing tasks that develop students' digital competence	418	7	6.38	4.73
Designing tasks that develop students' intercultural competence	418	7	6.75	5.37
Working with students	419	9	7.75	7.54
Setting up the classroom for online meetings	419	8	7.40	6.67
Preparing students for online meetings	419	8	7.05	6.03

Table 1 shows that participants rated their VE competences highest in the areas of working with students (M = 7.75), setting up the classroom for online meetings (M = 7.40), communicating with partners (M = 7.06) and preparing students for online meetings (M = 7.05). On the other hand, the participants felt least confident in finding partners (M = 5.56), and designing tasks that develop young learners' sociocritical competence (M = 6.30) and digital competence (M = 6.38). Analysing self-reported competences across countries did not reveal any major differences. In all four countries with the highest proportion of participants (Germany, Poland, Spain, and Slovenia), respondents identified 'finding partners' as the area in which they felt least confident, while 'working with students' and 'setting up the classroom for online meetings' were reported as the areas of greatest confidence.

Table 2

Differences in self-assessment of VE competences across different study programmes (Kruskal-Wallis test)

						Monte Carlo Sig.		
	Study Programme	**N**	**Mean Rank**	**Kruskal-Wallis**	**df.**	**Lower bound (99% CI)**	**Upper bound (99% CI)**	**Sig. a**
Self-assessed Competence	**Primary Education with English**	164	184.47	13.469	4	.005	.009	.007
	Primary Education	72	146.45					
	English Teacher	23	227.02					
	Pre-school Teacher with English	19	199.29					
	Pre-school Teacher	**78**	**176.17**					
	Total	**356**						

However, as shown in Table 2, there were significant differences in self-assessed competences across study programs (χ^2(H) = 13.469, df. = 4, p. = 0.007). Students enrolled in English Teacher Education reported the highest level of VE competence among all groups (MR = 227.02),

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while Primary Education students (without English) assessed themselves the lowest (MR = 146.45). Dunn's post hoc test revealed one significant pairwise comparison: on average, students specialising in Primary Education with English rated their VE competence significantly higher than students who did not choose this track (z = 3.270; p = 0.001).

Most Challenging Aspects of VE at Primary and Pre-primary Level

Similar to the previous research question, this item was also open-ended. Participants were asked to identify one aspect they would find most challenging when conducting VE projects.

Figure 5
Participants' perceptions on most challenging aspects of VE



Figure 5 indicates that participants identified students' low proficiency levels as the primary obstacle to conducting VE projects with pre-primary and primary learners. Technological issues were the second most frequently cited challenge, followed by student motivation and engagement during VE activities. Comparing results across countries reveals several notable differences. A significantly higher proportion of German students (17.6%) identified finding or working with a partner as the main challenge, whereas all other countries reported rates below 8%. Content selection was most frequently cited by Slovenian respondents (13.9%), well above the average of approximately 7% in other countries. In contrast, Spanish students reported the least difficulty with time manage-

ment (6%, compared to 10 to 17% elsewhere) but were significantly more likely to identify student proficiency or competence as the primary challenge (28.4%, versus 7 to 19% in other countries).

Participants' Needs in Developing VE Projects with Young Learners

Survey participants were asked to rank ten areas related to VE which they would like to develop professionally, 1 meaning "*the most*" and 10 meaning "*the least*". Table 3 presents the data in ascending order.

Table 3
Participants' needs in developing VE projects

Area	**Valid N**	**Mean Rank**
Creating a VE programme	398	5.151
Integrating VE projects within the curriculum	398	5.423
Finding topics for VE projects	396	5.456
Finding appropriate tools for VE	399	5.526
Improving ICT competences for VE projects	400	5.526
Finding resources for VE	399	5.554
Designing meaningful tasks for VE	399	5.556
Organising VE online meetings	398	5.556
Getting partners	399	5.597
Managing online meetings with students	398	5.654

All areas received a similar mean rank (around 5), indicating that responses were widely distributed and that participants considered all areas to be of relatively equal importance for professional development (Table 3). However, creating a VE programme received the lowest rank, suggesting a particularly strong need for professional development related to the overall process of programme design. Integrating VE projects into the curriculum and identifying suitable topics for VE projects were also ranked slightly lower than the other areas, indicating greater interest in developing expertise in these aspects. Further analysis revealed some differences between countries. German students identified 'organising VE meetings' as the area in which they would most like to develop professionally, while Polish and Slovene students prioritised 'creating a VE programme'. In contrast, Spanish students most frequently selected 'finding appropriate tools for VE' as their preferred area for further development.

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Participants' Intentions to Implement VE in Their Future Professions

The final area of enquiry concerned participants' intentions to implement VE in their future teaching. This was assessed through an open-ended question placed at the end of the survey, which resulted in a substantial drop-out rate. Nevertheless, 114 responses were obtained and categorised into three levels of willingness: 'yes', 'don't know yet', and 'no'.

Figure 6

Participants' plans to carry out VE projects in their future professions

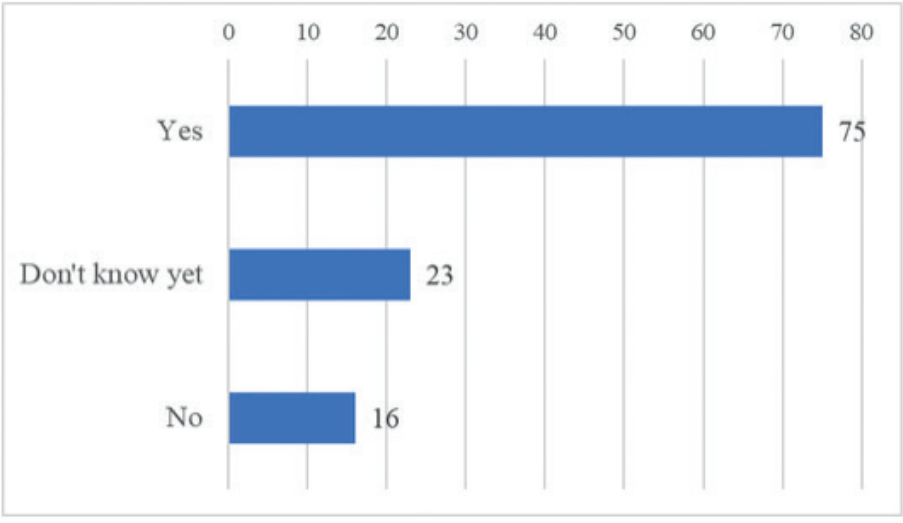


Figure 6 shows that 75 students (65.8%) expressed a willingness to integrate VE into their future work. Notably, 19 of these participants indicated that they would do so if they received additional support or gained more knowledge about VE. Similarly, most respondents who answered "no" (13 out of 16) explained that their reluctance stemmed from insufficient knowledge about the approach. Both findings highlight the need for further professional development in this area. Further analysis did not reveal any significant relationship between study programme and willingness to implement VE in teaching. However, the data suggest a positive association between self-assessed competence and the likelihood of carrying out a VE project: the proportion of participants willing to implement VE increased from 54.2% among those who considered themselves not competent to 87.5% among those who identified as very competent.

Discussion

Regarding the first research question, which examined participants' perceptions of and experiences with using VE at the pre-primary and primary levels, the findings are consistent with those reported in previous studies. Respondents in our study perceived VE as an effective means of developing cultural awareness, promoting student autonomy, and providing opportunities for authentic communication. Comparable results emerged from the open-ended question about the added value of VE. Interestingly, there were no differences in the results among participants from different countries. These findings align with those of the EVALUATE Group (2019), in which teachers identified VE as a valuable tool for fostering language development, particularly in terms of improving language confidence and expanding vocabulary. In addition, they reported a deeper understanding of cultural diversity and enhanced intercultural competence (the EVALUATE Group, 2019). VE made the concept of intercultural competence more concrete for them and helped them develop more effective communication strategies when encountering cultural differences. Similarly, studies by O'Dowd (2021), Dooly and Vinagre (2022), Pennock-Speck and Clavel-Arroitia (2022), and Pieczka (2021) also reported enhanced cultural understanding among students participating in VE projects. In particular, Pennock-Speck and Clavel-Arroitia (2022) found that authentic communicative activities in VE increased students' interest in both the target language and its culture.

We anticipated that participants would have limited experience with VE, either through direct participation in VE projects or through learning about such projects during their studies. However, we did not expect the proportion to be so low: fewer than 10% of participants reported having either learned about VE or participated in VE projects during their preservice education as future primary or pre-primary teachers. Similar findings were reported by Rets et al. (2023) and Symeonidis and Impedovo (2023), both of whom found that only a small proportion of participants had previous experience with VE projects. O'Dowd and Vinagre (2024) further argue that, despite their many advantages, VE projects remain relatively uncommon while also emphasizing that prior engagement with VE contributes to the more successful implementation of such projects in educational contexts.

The second research question focused on participants' self-perceived

competences related to VE and the challenges they foresaw in conducting VE projects. Participants rated themselves highest in competences related to working with students, preparing classrooms for online meetings, and communicating with partners, while they felt least confident in finding partners and designing tasks that foster primary students' sociocritical and digital competences. These findings resonate with previous research pointing to gaps in pre-service Early Childhood and Primary teachers' digital competence (Gabarda Méndez et al., 2017), as well as to challenges in designing appropriate tasks for young learners in VE environments (Cutrim Schmid & Whyte, 2015; Vinagre et al., 2024).

Similar challenges in designing appropriate tasks for young learners have also been identified by Cutrim Schmid and Whyte (2015) as well as Vinagre et al. (2024). Significant differences emerged across study programs, with students enrolled in primary education with English rating their competences higher than those studying only primary teaching, suggesting that an additional language component during studies can enhance readiness for teaching in linguistically and culturally diverse environments. These findings align with Rets et al. (2023), who found that language education students demonstrate higher intercultural effectiveness, reflective depth, and confidence in VE interactions. This increased confidence is especially relevant in the context of teacher education, as research indicates that teachers in pre-primary and primary education may experience insecurity when assuming responsibility for FL teaching. Teachers' perceptions of their own language proficiency can significantly influence their confidence in teaching (Brzosko-Barratt et al., 2025; Enever, 2014; Faez et al., 2021). Consequently, ITE programmes should strengthen the FL education component by developing prospective teachers' linguistic competence and pedagogical knowledge, thereby enhancing their confidence and preparedness to undertake language teaching and use innovative pedagogical approaches.

According to the survey results, participants perceived the main challenges in implementing VE to be primary students' low language proficiency, inadequate technological equipment and internet connectivity, as well as limited student motivation and engagement. Although some minor differences emerged among participants from different countries, language proficiency was consistently identified as the primary concern. Similar findings were reported by Ala-Kortesmaa and Muñoz (2023) and Dooly and Vinagre (2022), who emphasised the importance

of scaffolding young learners' language when designing tasks for VE projects. Technological barriers have also been highlighted in previous research. For example, the EVALUATE Group (2019) identified challenges related to coordinating synchronous meetings across different time zones. Likewise, Hinshaw et al. (2022) and Wigham and Clavel-Arroitia (2025) identified technological reliability, access to digital infrastructure, and students' digital readiness as persistent obstacles to effective VE implementation. As regards student motivation and engagement, Yang (2020) noted that varying levels of student participation significantly influence the overall effectiveness of VE projects. Bennett and Wigham (2024) emphasized the crucial role of task design in promoting learner engagement and motivation. Based on their findings, they recommend tasks that encourage learners to share personal information, as well as collaborative activities that promote comparison and interaction among students.

Within the final research question, we aimed to identify participants' needs and intentions regarding the implementation of VE at the primary and pre-primary levels. Participants considered all suggested areas of VE-related professional development important; however, their most pressing needs concerned designing VE programmes, integrating them into the curriculum, and selecting appropriate tools for successful implementation. These findings highlight the need for practical teacher education that provides concrete guidance, structured support, and hands-on experience. Similar observations were made by Rets et al. (2022) and Nissen and Kurek (2020), who found that teachers particularly valued support in task design and practical guidance for developing VE programmes. Wigham and Clavel-Arroitia (2025) in their needs analysis with primary and secondary teachers reported that the majority of primary teachers lack technological training related to the use of tools and applications for VE projects while secondary teachers expressed the need for pedagogical training, including the appropriate inclusion of VE tasks into the curriculum.

What we find most important is that participants expressed a strong willingness to implement VE projects in their future professional practice, especially when adequate support is available. Moreover, the correlation between self-assessed competence and the likelihood of implementing VE projects suggests that greater confidence increases teachers' readiness to engage in VE. As Rets et al. (2022) and Bennett and Wigham

(2024) also noted, teachers' competences in implementing VE increase when they receive appropriate support, further demonstrating the interdependence between perceived competence and classroom practice. They emphasise the importance of introducing VE into pre-service teacher education, enabling future teachers to gain first-hand experience of digital collaboration and to critically reflect on how to design appropriate tasks for their learners (Bennett & Wigham, 2024).

Conclusion

The study is significant because it involved a large sample of pre-service preschool and primary teachers who will work with young language learners with specific educational and linguistic needs. Consequently, the findings provide valuable data for tailoring VE teacher education modules to the needs of future educators aiming to design meaningful early language learning experiences. According to the survey, pre-service teachers found task design and language scaffolding strategies particularly challenging when planning VE for young learners. Additionally, the results highlighted that pre-service teachers require support in integrating VE into pre-primary and primary curricula, as well as in selecting and using digital tools that effectively foster language learning. Although the participants recognized that VE can provide opportunities for intercultural interaction and collaboration, they felt insufficiently competent to design activities that develop young learners' intercultural understanding and social awareness.

The study indicated that pre-service teachers are very positive about implementing VE in their future classrooms. However, we strongly believe that, in order for them to fully recognize its pedagogical value, they must be given opportunities to engage directly in such projects during their initial training. This can be achieved in two ways: first, by offering student teachers opportunities to participate in VE as learners, and second, by involving them as designers of VE activities during their teaching placements. The former is important because it enables them to engage in carefully selected, meaningful collaborative tasks with their peers, through which they deepen their understanding of and reflection on VE. The latter is especially important for gaining confidence in implementing these strategies in real classroom contexts under the supervision

of experienced mentors. Both experiences contribute to a deeper grasp of the complexities involved in creating and executing VE projects.

While this study provided an overview of the training needs of pre-service early language teachers through survey research, a beneficial next step would be to conduct follow-up interviews. Such interviews could yield deeper insights into challenging areas, particularly when pre-service teachers undertake their first VE exchanges. This qualitative data would provide a more nuanced understanding of the practical challenges future educators face. Another area of research could address the collaborative aspects of both student teachers and mentor teachers co-designing and co-teaching young learners utilizing VE. Describing such collaborations could inform more effective planning of VE teacher education modules focused on early language teaching.

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