Developing Virtual Innovation and Support Networks for In-Service and Pre-Service Teachers

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About the VALIANT project:

VALIANT is a European Policy Experiment under Erasmus+ KA3 (EACEA/38/2019): Priority 3 - Strengthening teacher training and education by using the opportunities of new technologies (School education). The policy measure in this experimentation, Virtual Innovation and Support Networks, are defined as **Virtual Exchange programmes which bring together teachers, student teachers and experts in facilitated online collaboration around real-world educational issues**. VALIANT's first objective is to test the efficiency of Virtual Innovation and Support Networks as an approach which will contribute to overcoming teachers' sense of isolation and low motivation in rural areas and isolated contexts and also to developing teachers' ability to operate effectively in online international networks of professional collaboration. The second objective of the experimentation is to test the efficiency of this form of Virtual Exchange for providing students of Initial Teacher Education with access to the realities of the teaching profession through regular interaction with in-service teachers integrated into their study programme.

About this publication:

To guide the development of VALIANT's Virtual Exchange modules, we reviewed academic and policy literature on using online collaborative technologies to best serve the needs of the different populations taking part in VALIANT. This report begins with an exploration of European policy documentation regarding virtual collaboration in teacher education. This is followed by a review of publications which detail the pedagogical justification for using Virtual Exchange in teacher education. The remaining two sections then synthesize research on Virtual Exchange in Initial Teacher Education and research on Virtual Exchange in professional development programmes. Key issues and findings from each of these four sections and their implications for the design and implementation of the VALIANT modules are presented in the conclusion.

The VALIANT team would like to recognise the role of Sara Clement from the University of Maryland, Baltimore County in editing and formatting this publication.

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Introduction

VALIANT (Virtual Innovation and Support Networks for Teachers) is an Erasmus+ KA3 project that sets out to develop virtual support networks using online collaborative technologies to bring together practicing teachers, student teachers, and educational experts to address the professional needs of teachers working in rural or isolated contexts throughout Europe and to support their ability to operate effectively in online international professional networks.

One particular approach to teacher education that incorporates online collaborative technologies is Virtual Exchange (VE), a well-established pedagogical practice that uses communication technologies to link classes, groups, or individuals from different geographical and cultural backgrounds in online intercultural collaborative projects (Jager et al., 2019). Virtual exchange has also been the object of increasing interest as a tool for fostering a range of 21st century skills that are critical for the workplace including media and digital literacy, communication skills, collaborative skills, empathy, global awareness, and intercultural competence (Helm & O'Dowd, 2020) among different populations of students in higher education, including among students of Initial Teacher Education (The EVALUATE Group, 2019). Beyond its many benefits for student teachers, Virtual Exchange also represents a particularly rich approach to fostering collaborative communities of practice among in-service teachers, which can support not only teachers' professional development but also their motivation and need for professional networks.

Accordingly, VALIANT's virtual innovation and support networks will consist of different Virtual Exchange modules designed to support the professional needs of both student teachers and in-service teachers. This includes, for example, Virtual Exchanges which bring together classes of Initial Teacher Education, Virtual Exchanges which link students of Initial Teacher Education with in-service teachers, and Virtual Exchanges that bring together in-service teachers from different countries.

To guide the development of these Virtual Exchange modules, we reviewed academic and policy literature on using online collaborative technologies to best serve the needs of the different populations taking part in VALIANT. We present here in this report the main outcomes of this literature review.

This report begins with an exploration of European policy documentation regarding virtual collaboration in teacher education. This is followed by a review of publications which detail the pedagogical justification for using Virtual Exchange in teacher education. The remaining two sections then synthesize research on Virtual Exchange in Initial Teacher Education and research on Virtual Exchange in professional development programmes. Key issues and findings from each of these four sections and their implications for the design and implementation of the VALIANT modules are presented in the conclusion.

European Policy and Virtual Teacher Collaboration

This part of the report delineates the insights derived from European policy documentation pertaining to virtual collaboration in teacher education, highlighting the need for teachers in Europe to participate in online communities of practice (CoPs) in order to advance their continuous professional development. It pays particular attention to the teachers employed in rural and isolated areas of Europe who may lack the opportunities for accessing resources or organised groups of colleagues in different countries that promote collaboration and peer coaching. Finally, it also emphasises the pressing need for virtual collaboration in teacher education in the post-pandemic era which has, inevitably, rendered educators isolated, irrespective of their geographical location.

Communities of Practice and digital technologies in education

Teacher collaboration and training support are two key areas of continuous professional development which can be conducive to maintaining or increasing teachers' motivation as well as fostering professional performance. European policy documentation has highlighted the importance of creating Communities of Practice, groups of people who share a common interest in something they do and improve their practice through regular interaction (Wegner, 1998), which afford opportunities for teachers to collaborate with peers and build their continuous professional development. Such organised groups may also contribute towards supporting teachers in solving routine or insurmountable challenges

that emerge in their teaching contexts while at the same time enhancing the attractiveness of the teaching profession. As the *OECD* (2019) report, one of the main challenges of maintaining teachers' motivation and enriching their professional experience is the professional isolation caused by lack of networking and collaboration opportunities with other colleagues and experts. The VALIANT project proposes the development of *Virtual Innovation and Support Networks* which can be defined as virtual communities of practice which enable international collaboration, training and support opportunities for teachers and student teachers.

The possibility of being able to collaborate and consult with colleagues and experts in order to overcome the day to day problems of the classroom is considered key by practising teachers. The *European Commission's Study on Policy Measures to improve the Attractiveness of the Teaching Profession in Europe Volume 2* (2013) reports that in their large-scale study when teachers were asked "What kinds of support during a career help to better manage the problems?", the vast majority of respondents across all of Europe chose the option "the opportunity to consult with colleagues" (p.178). The report concludes: "…the teachers who took part in this study expect assistance that helps them address the difficulties they are facing: consultation and dialogue with members of the school staff, continuous professional development programmes tailored to their needs and access to specialists for more serious issues" (p.179). Within the VALIANT project, we propose that participation of teachers in the *Virtual Innovation and Support Networks* will help to address the aforementioned aspirations as teachers will engage in facilitated collaboration, discussion, and mentoring with peers and experts.

The way teacher education can be approached has been redefined in the highly digitised era we are living in, resulting in many configurations that can be implemented to support schoolwide or individual goals. Virtual teacher collaboration and online peer teaching activities have been supported by many European initiatives and documentation. For example, the *Eurydice Report* (European Commission/EACEA/Eurydice, 2015) refers to "…more flexible approaches to Continuous Professional Development that apply adult learning methods based on communities of practice, online learning and peer learning". The Council of Europe in the *Council conclusions on European teachers and trainers for the future* (2020) point out that "…it is important for teachers to participate in various training models, including face-to-face, virtual, blended and work-based learning" (p. 15). The *Virtual Innovation and Support Networks* of the VALIANT project offer teachers the opportunity to be trained online and to draw from their situated, work-based experiences. VALIANT also clearly reflects the priorities of the 2015 *Joint Report of the Council and the Commission on the implementation of the strategic framework for European cooperation in education and training* (ET 2020) which states that "[e]ducation and training should reap the benefits of new ICT developments and adopt innovative and active pedagogies, based on participatory and project-based methods". VALIANT's *Virtual Innovation and Support Networks* exploit online environments to support teachers' ongoing professional development and in particular, will help the large cohort of teachers (according to the 2018 TALIS results, up to 30% of teachers in some countries) who are not comfortable using online technologies in their teaching.

Participation in these networks will give teachers first-hand experience of participating in online collaborative contexts and will also provide them with specific training of digital competence which they will later be able to use in their own teaching. In addition, the *Digital Education Action Plan* (European Commission, 2018) focuses on the digital transformation of education and highlights the need to help teachers and trainers make better use of technology. Empowerment of educators, digital readiness and promotion of digital competence are at the core of the *Action Plan* which points out that "innovation in education and training depends greatly on empowering and connecting educators" (p.5) and this project will bring educators together with fellow teachers as well as future teachers in collaborative networks. The *Action Plan* also lays great emphasis on the development of digital competences for teachers through the recently-published *European Framework for the Digital Competence of Educators*: DigCompEdu (European Commission, 2017a). Participating in *Virtual Innovation and Support Networks* will involve the development of teachers' online collaboration and communications skills as well as their ability to use digital technologies for professional collaboration, reflective practice and digital continuous professional development – referred to by the DigCompEdu (2017a, p.19) as "professional engagement".

The *Digital Education Action Plan* (European Commission, 2018) also emphasises blended mobility to connect educators, an approach that combines physical mobility and virtual activity. This goal has been supported by previous

and ongoing European initiatives such as eTwinning and School of Education Gateway. There seems to be sustained interest in these two programmes which is manifested in the European Commission's (2016) study on *Improving and Modernising Education* which calls for stronger support to teachers and school leaders through the aforementioned programmes in order to "support constructive exchanges between teachers and other practitioners on what works in school education". Similarly the European Commission's (2017b) study on *School Development and Excellent Teaching for a Great Start in Life* highlights the development of "online communities and resources for school professionals through new eTwinning opportunities for student teachers, online networks for early career teachers and their mentors, online courses (including MOOCs), exchange of best practice among providers of Initial Teacher Education and a Digital Competence Framework to support teachers' self-assessment and development".

The VALIANT project, through its *Virtual Innovation and Support Networks*, addresses the need for blended mobility in support of collaboration between teachers, teacher trainers, and students of Initial Teacher Education. The VALIANT Networks provide opportunities for facilitated, technology-mediated exchanges which will not only connect experienced in-service teachers, but will also involve early career teachers who need assistance and mentoring as they enter their teaching path. *Virtual Innovation and Support Networks* will provide students of Initial Teacher Education with 'first-hand' access to the realities of the teaching profession and the training necessary to set up and participate in their own virtual international networks in the future. As such, the VALIANT project is also in line with the policies promoted by the European Commission in regard to digital competence development. In particular, the project reflects the priorities of the ET2020 Working Group on Digital Skills and Competences. In the publication *Education and Training 2020 Highlights from the ET2020 Working Groups 2016-2017* (European Commission, 2019) the Working Group underlines the importance of teacher education and highlights that teachers should be supported in developing digital competences in both initial training and continuous professional development. They call for digital tools and new pedagogies to be made an integral part of teacher training and they recommend peer-learning, sharing good practices and creating networks as examples of effective tools to promote easily accessible training and upskilling as well as empowerment (p.18). This project will bring together practitioners in schools with peers, experts, and students of Initial Teacher Education to learn and support each other in collaborative digital spaces.

Teachers in rural and isolated areas and professional isolation

Teacher collaboration and peer coaching are particularly important in challenging teaching and learning environments, such as rural and isolated areas or in other educational contexts which mandate stronger support for teachers due to limited technological infrastructure or reduced opportunities for enhancing teachers' digital competence. The European Commission's study (2017c) *Strengthening European Identity through Education and Culture* mentions that "Europe is lagging behind in making use of [i]nnovation and digital technologies in education. Too many schools do not yet have access to high-speed connectivity and digital equipment, and not enough teachers benefit from professional development programmes in these fields" (p. 8). Similarly, the European Commission's recent study (2020) on *A Strong Social Europe for Just Transitions* draws attention to the 'urban/rural divide' and the need to "support poor regions catching up with wealthier areas" (p. 2). The VALIANT project addresses the need in national and European contexts for teachers in rural areas of Europe and in other contexts of isolation (such as that being experienced currently by many teachers due to the pandemic) to have access to *Virtual Innovation and Support Networks* which will enable them to continue their professional development, learn from experts, collaborate with colleagues in different countries, and act as mentors for future teachers.

The case of teachers working in rural areas is particularly relevant in the VALIANT project. The OECD working paper *Learning in rural schools: Insights from PISA, TALIS and the literature* (2016) found that rural districts often had limited access to specialised expertise, such as curriculum specialists and instructional coaches. Attending workshops was reportedly often more difficult given long driving distances, and the necessity of staying overnight and finding substitute teachers. Furthermore, data from *OECD PISA* 2015 also confirms that difficulties to organise in-house professional development activities, such as inviting specialists, in rural schools are common across countries. These difficulties and limited opportunities for professional development may lead to teachers' feeling isolated and unmotivated. The *Virtual Innovation and Support Networks* implemented in this project support the proposal of the latest *Eurydice Report (*European Commission/EACEA/Eurydice, 2021) which mentions that "teaching should cease to

be seen as an isolated profession with limited or no career evolution and become a part of the larger family of school education professions instead. instead. The development of national career frameworks could be a starting point for policies around career structures that provide teachers with a diversity of opportunities and connect the different school education professions" (p. 17).

Virtual collaboration in the post-pandemic era

The current COVID-19 crisis and the closing of schools and universities across Europe have meant that many teachers and students have found it necessary to engage in teaching and learning online and to adapt to working in the physical confinement of their own homes. Whereas problems of isolation were common until recently in the context of teachers in rural areas or other particular situations, the aim of ensuring that teachers and student teachers can continue to teach, learn, and collaborate in contexts of isolation is now relevant for a large majority of the teaching profession in Europe. By participating in *Virtual Innovation and Support Networks*, teachers and student teachers will develop their online collaboration and communication skills as well as their ability to use digital technologies for professional collaboration, reflective practice, and digital continuous professional development.

The *Virtual Innovation and Support Networks* aspire to respond to the emerging need for continuous professional development through virtual collaboration and peer support. The VALIANT Networks offer diverse virtual collaboration opportunities, such as 'Teacher as Learner', 'Teacher as Mentor', 'Teacher as Source of Experience', 'Teacher as International Collaborator', and 'Teacher as career professional'. All these configurations are facilitated by trained experts and aim at highlighting the potential of online intercultural learning in the form of Virtual Exchange. The VALIANT Networks are a response to European and universal aspirations for quality education and professionalism in the modern digital era.

Pedagogical Justifications for Using Virtual Exchange in Teacher Education

This next part of the report provides a pedagogical justification for the use of Virtual Exchange in teacher education. It begins with a recently developed definition of this pedagogical practice and looks to the work of specific researchers who have investigated Virtual Exchange in teacher education including Olsen et al. (2006), O'Dowd et al. (2020), Háhn (2020) and others. This section then explores the value of Virtual Exchange in teacher education and its relevance to teachers, teacher trainers and students both during and prior to the COVID-19 pandemic.

To begin with, the pedagogical practice of Virtual Exchange is defined as follows:

> Virtual Exchange (VE) is a practice, supported by research, that consists of sustained, technology-enabled, people-to-people education programmes or activities in which constructive communication and interaction takes place between individuals or groups who are geographically separated and/or from different cultural backgrounds, with the support of educators or facilitators (EVOLVE, 2019).

This approach of Virtual Exchange has been practiced by many people in recent years and has thus gained in popularity (O'Dowd et al, 2020) because, as Háhn (2020) argues, "Virtual exchange offers a great opportunity for students to acquire the skills and literacies needed for transnational online teamwork" (p. 189). In addition, Virtual Exchange also "...provides an accessible, ground-breaking way for young people to engage in intercultural learning experiences online" (Helm & Van der Velden, 2020, p. 8).

An example of these benefits can be seen in the work of Olsen, Zimmer, and Berh who researched the success of a Virtual Exchange, based on 'The German and American Politics Electronic Classroom (2006)'. They found that Virtual Exchange had a positive impact on students as it helped them deepen their knowledge on the topic. Students also strengthened social and peer cooperation, successfully learning about the culture of other countries and the customs of the people. An additional positive effect upon students participating in the Virtual Exchange was that studying abroad seemed much more attractive to them than before (Olsen et al., 2006).

As argued above, the beneficial aspects of Virtual Exchange as a pedagogical practice primarily concern students, but it also benefits teachers as well. These benefits stem from the fact that Virtual Exchange differs from "from other

forms of virtual learning and initiatives" (Helm & Van der Velden, 2020, p. 17) as described by the European Education and Culture Executive Agency:

> 1. It is technology-enabled and uses the broad reach and scope of new media technologies to bring geographically distant people together.
>
> 2. Its focus is primarily on people-to-people real-time dialogue in which participants learn from each other, as opposed to content- driven learning.
>
> 3. It allows for face to face interactions which are guided by trained facilitators or educators to ensure they are meaningful and explicitly address the intended learning outcomes of intercultural understanding.
>
> 4. The exchange is sustained over time as a pedagogical process
>
> (European Education and Culture Executive Agency [European Commission], 2020, p. 2).

Another positive side of Virtual Exchange has been identified by Knight (2020) who found that asynchronous computer-mediated communication was particularly beneficial for career-oriented groups of students, such as those in a teacher training program group. Furthermore, Pena-Shaff and Nicholls (2004), found that the quality of interactions in asynchronous computer-mediated communication also improved.

As a pedagogical practice, Virtual Exchange also upgrades the traditional notion of mobility. Through communication technology, it brings together many different people and their cultural characteristics as part of a learning experience (European Education and Culture Executive Agency [European Commission], 2020, p. 4): "With a broad reach within and far beyond Europe's borders, it can bridge more important cultural divides, giving young people exposure to a variety of different world views and beliefs" (European Education and Culture Executive Agency [European Commission], 2020, p. 4).

Research on the methods employed in Virtual Exchange have uncovered multiple benefits. One study found that different Virtual Exchange activities increased comfort levels and improved interaction (European Education and Culture Executive Agency [European Commission], 2020, p. 5): "The project activities also increased participants' self-esteem, contributing to a more confident and effective group of students able to tackle challenges relevant to them" (European Education and Culture Executive Agency [European Commission], 2020, p. 5).

However, for Virtual Exchanges to be successful, the moderators of these exchanges must focus on ensuring that all participants have the appropriate technical knowledge necessary to interact in Virtual Exchanges. They must also devote sufficient time to the development of basic digital competences and should take various measures to promote lasting cooperation in such exchanges, including strengthening personal links between participants. Only in this way will they be able to increase the quality of group work and collaboration.

Accordingly, the methodology of Virtual Exchange raises the quality of education and pedagogical work for students and for teachers. During the COVID-19 pandemic, the practice of Virtual Exchange became even more crucial than before (Helm & Van der Velden, 2020). It therefore makes sense that, regardless of the current COVID-19 situation, both teachers and students would benefit from experience and training in Virtual Exchange.

Virtual Exchange in Initial Teacher Education

Publications on key issues and learning outcomes arising from Virtual Exchange for university student populations are extensive and, in certain disciplines such as foreign language studies, extend as far back as the 1990s (O'Dowd, 2018). A subset of this research has also explored the use of Virtual Exchange in courses of Initial Teacher Education. This includes both small-scale studies that have investigated the experiences and learning outcomes of students from classes involved in a single class-to-class Virtual Exchange partnership as well as more recent larger scale studies that have explored the learning outcomes of hundreds of students from multiple partnerships. To guide the development of VALIANT's various Virtual Exchange modules which involve classes of Initial Teacher Education, this body of studies

has been synthesized under two main themes: the type of learning outcomes supported by Virtual Exchange which are deemed particularly relevant to a teacher's professional development, and the key issues and considerations needed to address the particular needs of students of Initial Teacher Education.

Learning outcomes

Both large-scale and small-scale studies have investigated learning outcomes resulting from Virtual Exchanges involving classes of Initial Teacher Education. While most of these studies have looked at teacher to teacher partnerships which pair two or more classes of student teachers in different contexts or countries, others have involved an apprenticeship partnership (Lenkaitis, 2020) in which student teachers are partnered with learners similar to those they will eventually teach. A review of these studies have identified the following main learning outcomes: disciplinary skills and knowledge related to teaching, digital skills, and intercultural competence.

Virtual exchanges have been found to support discipline-specific skills and knowledge required of pre-service teachers. For instance, as part of an apprenticeship Virtual Exchange partnership linking pre-service teachers of English in the United States with upper secondary school students of English in Sweden, student teachers had the opportunity to apply their developing knowledge of English grammar by giving feedback or grammar explanations to their partners (Sauro, 2013). In a similar apprenticeship model, student teachers of English partnered with learners, who were given the opportunity to view and reflect on videos of their interactions, also deepened their knowledge of linguistic concepts and their ability to recognize patterns and issues in learners' spoken language production (Lenkaitis, 2020).

In a related vein, Virtual Exchanges that partner two or more classes of student teachers have been found to support the development of more general teaching competences. This includes the development of sensitivity and agency regarding engaging cultural and linguistic diversity in teaching (Zhang et al., 2016), the development of critical thinking skills and the ability to link theory to the practical application of technology for future teaching practice (Dooly & Sadler, 2013), and when linked to a teaching practicum, the development of key teaching skills such as increased awareness of student-based learning, planning, and classroom management (Loranc-Paszylk et al., 2021). In one of the large-scale multi-site studies of Virtual Exchange across many subject areas, investigations focusing specifically on students in courses for Initial Teacher Education also found that Virtual Exchange helped these student teachers in the development of activities, in discovering relevant teaching tools, improving teaching methods, and in adapting to students' needs (EVOLVE Project Team, 2020).

A second and related domain of learning outcomes arising from Virtual Exchanges for Initial Teacher Education are digital skills, specifically for use in teaching. These include not only the development of digital skills and knowledge of digital tools for the purpose of organizing and running Virtual Exchanges in future teaching contexts (Carloni & Zuccala, 2018), but also knowledge of and confidence in their critical selection and use of new media technologies (Zhang et al., 2016) or different communication technologies and platforms (e.g. wikis, virtual environments) for incorporation into future teaching practice (Dooly & Sadler, 2013). Most of these findings originate in smaller-scale studies of focal students or single pairs of classes; however, Rienties et al., (2020) investigated the development of TPACK scores (techno-pedagogical skills) among a subset (n=622) of pre-service teachers who took part in the EVALUATE project and represented 23 Virtual Exchanges linking 34 institutions in 16 countries. The size of their study enabled them to carry out statistical analysis of TPACK in relation to a comparison group of pre-service teachers who did not take part in Virtual Exchanges. Although findings revealed no significant difference between these two groups' TPACK scores over time, further analysis did reveal a relationship between TPACK, Virtual Exchange, and foreign language learning: specifically, pre-service teachers with stronger TPACK scores benefited more from their Virtual Exchange experience, and teacher candidates who improved their TPACK scores over time were also more likely to improve their foreign language scores.

The final domain of learning outcomes that have been investigated is that of intercultural competence. Numerous small-scale studies have documented the development of intercultural competence among pre-service teachers in Virtual Exchange partnerships with pre-service teachers from other countries, whether as a result of specific tasks and topics of discussion they engaged in with their international peers either synchronously (Eren, 2021) or asynchronously (Üzüm et al., 2020), or as a result of in class discussion and post-Virtual Exchange reflection tasks (Sauro, 2016). Such

intercultural learning has been found to occur in response to critical complex tasks that were designed to push student teachers to question stereotypes and develop a more critical cultural awareness (Eren, 2021) as well as through collaboration around pedagogical tasks and activities without an explicit cultural focus (Dooly, 2011). In addition, findings from the large-scale multi-site EVALUATE project confirmed the positive impact of Virtual Exchange on the development of intercultural competence relative to comparable pre-service teachers who did not take part in Virtual Exchanges (The EVALUATE Group, 2019).

Key issues and considerations

A review of the literature has also identified key issues and considerations for Virtual Exchanges in Initial Teacher Education that should inform the design and implementation of the VALIANT modules. This includes specific considerations which are mainly relevant for Virtual Exchanges involving professional students and those training for teaching careers.

The first of these considerations concerns the organization of the Virtual Exchange and its focus. When working with students of Initial Teacher Education, it is important to be mindful of the benefits and drawbacks of partners' backgrounds and levels of experience. Lawrence and Spector-Cohen (2018) suggest ensuring there is not too great a degree of disparity in teaching experience in Virtual Exchanges that partner student teachers with practicing teachers or that if there is, explicit guidance and check-ins be provided to ensure student teachers are not taking too passive a role. In addition to being mindful of differences in teaching experience, another organizational consideration is being aware of the differences in educational socialization (Belz & Mueller-Hartmann, 2003) that these pre-service teachers bring to the Virtual Exchange and the influence that can have on collaboration and approach to tasks.

In apprentice Virtual Exchange partnerships where pre-service teachers work with actual students, Lenkaitis (2020) highlights the importance of using recordings and opportunities for reflection as a way to deepen student teachers' content knowledge and their ability to apply course content to practice. Dooly (2011) also points to the crucial role of the instructor or facilitator leading the Virtual Exchange to lead students outside their comfort zones and to guide them in intercultural learning, particularly when an intercultural focus may not be a salient aspect of the tasks or a focal element of the course in which pre-service teachers are enrolled. What Dooly proposes aligns with a specific type of pedagogical mentoring that has been found to support collaboration and constructive conflicts in Virtual Exchanges for pre-service teachers (O'Dowd et al., 2020).

Another key issue concerns the specific types of tasks that are used in the Virtual Exchange. One type of activity that has been successfully used with pre-service teachers are simulations of teaching scenarios which fostered constructive conversations and collaborations while also boosting intercultural awareness (Angelini & Muñiz, 2021). At the same time, variety in task complexity (Arnó-Macià & Schell, 2021) should also be considered as well as the sequencing of tasks in such as way as to prepare student teachers for developing both digital competences and the autonomy that they will apply toward their future teaching (Fuchs et al., 2012). In addition, reflective activities and tools such as learner diaries can be incorporated into the experience to ensure pre-service teachers can see a clear link between the activities completed for their Virtual Exchange and the content and learning goals of the courses in which the Virtual Exchange is embedded.

In summation, Virtual Exchange for Initial Teacher Education can support the professional development of pre-service teachers' disciplinary knowledge, digital skills, and intercultural competence. Key factors influencing productive experiences and which should guide the design of VALIANT's modules include the following: consideration of the types of tasks or activities that are developed in relation to the nature of the partnerships (e.g. a peer-to-peer model, an apprenticeship model, or a pre-service with in-service teacher model), incorporation of greater degrees of guidance and structure from Virtual Exchange facilitators to ensure successful collaboration in Virtual Exchanges where pre-service teachers are partnered with in-service teachers, and the incorporation of reflection components to deepen learning and to foster connections between coursework and the Virtual Exchange experience.

Virtual Exchange in Professional Development Programs

Sociocultural approaches to teacher professional development

The VALIANT model of Virtual Exchange which brings together teachers, student teachers, and experts in online communities of practice is essentially based on a sociocultural approach to teacher education. Sociocultural approaches reflect the principle that "learning to teach is a long-term, complex developmental process that operates through participation in the social practices and contexts associated with learning and teaching" (Freeman & Johnson, 1998, p. 402). Such approaches reject transmission models of teacher training and propose that teachers learn by being actively engaged in educational activity, forming part of communities of practice and having opportunities to reflect and theorize based on their own learning (Johnson, 2006, 2009; Wright, 2010). Sociocultural approaches to continuing teacher education have put great emphasis on facilitating collaboration and interaction between the content of training periods at university and the realities of classrooms.

Different examples are available of initiatives which have put sociocultural approaches to teachers' professional development into practice. One form of collaborative professional development is explored by Johnson (2009) who reports on "Teacher Study Groups" which involve long-term partnerships between public schools, universities, and professional associations that promote opportunities for university-based and school-based faculty to identify and study problems of practice together. The action research carried out in teacher study groups assumes that teachers work best on problems that they have identified in their own contexts and that these problems can best be overcome by working collaboratively with colleagues from different educational contexts. A similar approach is "critical friend groups and peer coaching" (https://nsrfharmony.org/faq-items/cfgvsplc/). According to the National School Reform Faculty, the organisation which promotes this activity, these practices consist of 5-12 members from schools who commit to improving their practice through collaborative learning and structured interactions (protocols), and meet at least once a month for about two hours.

Engaging teachers in online communities of practice

Some examples of the use of online networks in sociocultural approaches to teacher education can be found in the literature.These examples illustrate how online communities of practice can be formed which bring together in-service teachers, not only with colleagues in other schools, but also with student teachers. De Jong (2012) argues that the possibility to discuss and share teaching experiences with colleagues is extremely motivating for teachers and that organising structured communication between teachers can help them to interpret curriculum innovations and to support professional learning. He refers to online communities of practice for teachers as Online Teacher Learning Communities.

Research findings from such initiatives have found that teachers who participate in such collaborative communities of practice were able to develop new understandings of themselves as teachers, of the curriculum they taught, and of their own teaching practices. Teachers also reported emerging from the groups with an increased sense of efficacy and empowerment (De Jong, 2012). The VALIANT project reflects this approach by focusing on motivating and self-empowering teachers and helping them to better navigate the career system, to overcome feelings of isolation by being able to develop new competences, and, finally, to enrich their professional experience by opening up new professional networks.

Meskill et. al. (2006), for example, reported on a project which brought together novice pre-service teachers in collaboration with veteran in-service educators and doctoral students in collaborative project work. Both the new and experienced teachers worked together in classes, combining the practical up-to-date technology skills of the former with the pedagogical expertise of the latter in order to integrate innovative technology-enhanced activities into their classes. The doctoral students served as mentors to both these groups during the project work. In a similar project, also based on sociocultural approaches to teacher education, Schocker-von Ditfurth and Legutke (2002) strove to combine the work student teachers do in their university classrooms with the work of real foreign language classrooms. While participating in their university course, student teachers coordinated with an in-service teacher to prepare online projects for their students and then accompanied the in-service teacher to class in order to carry out

the projects. They then returned to the university to share and reflect on their experiences in their teacher training course.

Baek and Barab (2005) reported on the online community of practice for teachers called "The Inquiry Learning Forum" that provided science and maths teachers with a variety of tools for exploring inquiry-based teaching practices with other colleagues. Teachers shared short videos of their classes and read teachers' reflections on the lessons. Teachers took part in online discussions with each other regarding the lessons and asked questions to the presenting teachers.

Hanson-Smith (2006) underlined the importance of peer mentoring and teacher-to-teacher collaboration in Foreign Language teacher education and laments the lack of networks and teacher-support programmes which have been able to "create teacher-to-teacher collaborations that would serve as apprenticeships in the practice of new technological knowledge and skills" (p. 304). As a successful example of such an approach, she put forward *Webheads in Action*, which functioned as an online community of practice where educators learning to use new technologies in their classroom mentored each other, shared information, reflected on their learning experiences through online presentations, and engaged in technology-based learning projects with colleagues and their students.

Finally, Cutrim Schmid and Hegelheimer (2014) investigated a Computer Assisted Language Learning (CALL) teacher education programme that included pre-service/in-service teacher collaboration. Their research findings revealed several elements that assisted the in-service teachers especially in furthering their professional development, such as a) technical support for the design and implementation of technology-enhanced tasks, b) access to new pedagogical approaches and ideas, c) vicarious learning through observation of technology-enhanced instruction, and d) enhanced motivation through collaboration. The authors attributed the effectiveness of the pre-service/in-service collaboration that took place in her research to the fact that both groups were involved in a process of shared reflection that occurred in the midst of practice and generated insights that were grounded in a systematic evaluation of teaching and learning processes.

The value of online collaborative networks for teachers in times of COVID

Knight (2020) looked at the potential for online collaborative networks for teachers in the context of COVID-19. She argues that the onset of the pandemic means that all practitioners, even those who enjoyed previously robust professional networks, will endure some level of isolation and that online collaboration is key to overcoming this isolation. In order to identify how online collaboration and digital networks can be effectively employed in teacher education and professional development, she proposes four central principles:

(a) in order to develop in their careers, practitioners must participate in professional communities;

(b) practitioners need to be granted enough time for development to occur;

(c) mediators (both technical platforms and community leaders) have to provide ongoing support to practitioners;

(d) relationships among practitioners, regardless of their relative experience, are both collaborative and mutually beneficial.

(Knight, 2020, pp. 300-301)

These principles provide useful guidelines for the VALIANT team in developing its Virtual Exchange modules. This will be outlined in the final section of the document.

Conclusion

This report set out to survey current approaches to online collaborative technologies used in teacher education, with a specific focus on Virtual Exchange, to inform the development and implementation of the modules that comprise VALIANT's *Virtual Innovation and Support Networks.* Accordingly, the key outcomes and their relevance for the design and implementation of VALIANT's modules identified in the preceding sections of this report are summarized below.

The insights from European policy documentation on virtual teacher collaboration and peer coaching confirm the potential of online communities of practice for:

- Supporting teachers towards addressing day-to-day challenges arising in their classes;
- Advancing continuous professional development, helping both experienced and early career educators build a career path;
- Increasing the attractiveness of the teaching profession, making teachers feel less isolated professionally;
- Developing of digital competences which are necessary in educational contexts which are becoming increasingly technology-mediated;
- Increasing training opportunities in challenging learning environments such as rural or geographically isolated areas in Europe which do not afford sufficient opportunities for international teacher collaboration or professional training.

The above points are particularly important in the current and post-pandemic era which has clearly indicated the merits of virtual teacher-to-teacher interaction and online training support.

Findings from research on Virtual Exchanges in teacher education and professional development programs point to the following key points of relevance to the VALIANT project:

- Virtual exchange expands traditional notions of mobility through the use of communication technology to bring together geographically distant people and their cultural characteristics as part of a learning experience;
- Virtual exchanges carried out among classes of pre-service teachers have been found to support the development of disciplinary skills and knowledge related to teaching, digital skills, and intercultural competence.
- The possibility to discuss and share teaching experiences with colleagues is extremely motivating for teachers and organising structured communication between teachers can help them to interpret curriculum innovations and to support professional learning.
- Research has found that teachers that participate in such collaborative communities of practice were able to develop new understandings of themselves as teachers, of the curriculum they taught, and of their own teaching practices. Teachers also reported emerging from the groups with an increased sense of efficacy and empowerment.
- In the context of COVID-19, all practitioners, even those who enjoyed previously robust professional networks, will endure some level of isolation and that online collaboration is key to overcoming this isolation.

Accordingly, the VALIANT project reflects key points from these findings by focusing on motivating and self-empowering teachers and helping them to better navigate the career system, to overcome feelings of isolation by being able to develop new competences, and, finally, to enrich their professional experience by opening up new professional networks.

Finally, analysis of research on the design of Virtual Exchange for professional development and teacher training points to the following key considerations to guide the development of VALIANT's modules:

- Modules should consist of a range of task types which vary in degrees of complexity and include those which incorporate simulations of teaching scenarios to foster collaboration and conversation.
- In modules that include in-service teachers, consideration should be given to the different ranges of teaching experience between participants and what roles different students should perform within their collaborations.
- Facilitators should take an active role mentoring and guiding participants in the Virtual Exchange through a variety of techniques including the provisioning of explicit guidance, regularly checking in throughout the Virtual Exchange, or through leading participants in guided discussions outside their comfort zones.
- Reflective components and activities (e.g., reflective learner diaries or viewing of recordings) can be used to deepen learning and to help pre-service teachers make a connection between VALIANT's modules and the learning goals of the courses in which the Virtual Exchanges are embedded.

In conclusion, the policy and research literature confirms that Virtual Exchange programmes such as VALIANT's *Virtual Innovation and Support Networks* represent an alternate, sociocultural approach to teacher training and professional development which is underlined by the beliefs that:

1. teachers' informal, social, and professional networks, including their own classrooms, can be powerful sites for professional learning (Grossman, et al, 2001);
2. teachers stand to expand their professional knowledge and their ability to overcome isolation and improve their career paths by working collaboratively with colleagues from other European contexts (Snow, 2005); and
3. by working with colleagues at all levels of experience and expertise (including student teachers), they will respect, challenge, and support one another as they collectively seek to reach standards of excellence in their work (Johnson, 2009).

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