Comparison between Pre- and In-service Teachers' Experiences with Virtual Exchange and their Attitudes Towards Implementing Virtual Exchange into the Curriculum

INVITED - Integrating primary and pre-school virtual exchange projects into language teacher education

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Pre-service and in-service teachers' comparisons

The last stage of project analyses is comprised of differences between pre-service and in-service teachers (see the previous two reports, ***Pre-service Teachers' Experiences with Virtual Exchange and their AFtudes Towards Implementing Virtual Exchange into the curriculum - A needs analysis report*** and ***In-service Teachers' Experiences with Virtual Exchange and their AFtudes Towards Implementing Virtual Exchange into the curriculum*** - ***A needs analysis report***) . This has been enabled by similar questionnaire structure with comparable, often even identical content. The decision what to compare or rather where to inspect for differences was contingent upon formatting, meaning that only questions that had no conditions were eligible for testing.

Opinions regarding VE and self-assessed competence

Variable	Mann-Whitney Test: Differences between Pre-service and In-service teachers				
	Mean Ranks	U	Z	p	effect size estimate
Development of Language and Intercultural Skills with VE Variety	(n = 309) In-service teachers: **409.55** (n = 460) Pre-service teachers: 368.51	63,484.00	-2.533	**.011**	**r = - 0.09**
Difficulties in VE related to Learners' Age	(n = 308) In-service teachers: 353.62 (n = 460) Pre-service teachers: **405.18**	61,327.50	-3.174	**.002**	**r = - 0.12**
Self-assessed VE competence	(n = 250) In-service teachers: **374.54** (n = 419) Pre-service teachers: 311.41	42,489.00	-4.089	**<.001**	**r = - 0.16**

Table 1: Differences between participants' opinions regarding VE and self-assessed competence

We have found significant differences between groups in all three areas we investigated (Table 1). For a combination of statements that relate to language and skill development, in-service teachers have expressed a greater degree of agreement than pre-service teachers, meaning that they are more likely to perceive improvements and progress than their younger colleagues, whilst the exact opposite applies to cases denoting age-related difficulties, where pre-service teachers are more inclined towards agreeing, if not strongly agreeing, with VE being (too) time consuming or difficult when executed with younger participants, i.e. pupils.

Regarding VE-related competences where teachers had to assess themselves on a numerical scale from 1 to 10, in-service teachers have a significantly higher mean, indicating better overall scores than pre-service teachers. Acknowledging the effect size estimate, this difference has practical implications as well.

Preferences for training on specific VE areas

Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.996	16,819.947	9.000	605.000	.000
	Wilk's Lambda	.004	16,819.947	9.000	605.000	.000
	Hotelling's Trace	250.214	16,819.947	9.000	605.000	.000
	Roy's Largest Root	250.214	16,819.947	9.000	605.000	.000
Teacher level	Pillai's Trace	.025	1.733	9.000	605.000	.078
	Wilk's Lambda	**.975**	**1.733**	**9.000**	**605.000**	**.078**
	Hotelling's Trace	.026	1.733	9.000	605.000	.078
	Roy's Largest Root	.026	1.733	9.000	605.000	.078

Table 2: Preferences for training on specific VE areas

Tests of Between-Subjects Effects

Source	Dependent variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Teacher Level	**Creating a VE programme**	**41.291**	**1**	**41.291**	**4.427**	**.036**	**.007**
	Getting partners	13.195	1	13.195	1.404	.236	.002
	Managing online meetings with students	22.267	1	22.267	2.910	.089	.005
	Organising VE online meetings	2.851	1	2.851	.376	.540	.001
	Finding topics for VE projects	**47.125**	**1**	**47.125**	**6.566**	**.011**	**.011**
	Improving ICT competences for VE projects	.149	1	.149	.019	.891	.000
	Finding appropriate tools for VE	6.567	1	6.567	.979	.323	.002
	Finding resources for VE	.000	1	.000	.000	.994	.000
	Designing meaningful tasks for VE	2.742	1	2.742	.293	.588	.000
	Integrating VE projects within the curriculum	1.877	1	1.877	.177	.674	.000

Table 3: Participants' preferences for training on specific VE areas

Estimated Means

Dependent Variable	Teacher Level	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Creating a virtual exchange programme	In-service teachers	**4.613**	.204	4.213	5.013
	Pre-service teachers	**5.151**	.155	4.848	5.455
Getting partners	In-service teachers	5.293	.204	4.892	5.695
	Pre-service teachers	5.597	.155	5.293	5.902
Managing online meetings with the students	In-service teachers	6.049	.184	5.687	6.411
	Pre-service teachers	5.654	.140	5.379	5.929
Organizing virtual exchange online meetings	In-service teachers	5.698	.184	5.337	6.058
	Pre-service teachers	5.556	.139	5.283	5.830
Finding topics for virtual exchange projects	In-service teachers	**6.031**	.179	5.680	6.382
	Pre-service teachers	**5.456**	.136	5.190	5.723
Improving ICT competences for virtual exchange projects	In-service teachers	5.493	.188	5.124	5.862
	Pre-service teachers	5.526	.143	5.245	5.806
Finding appropriate tools for virtual exchange	In-service teachers	5.311	.173	4.972	5.650
	Pre-service teachers	5.526	.131	5.268	5.783
Finding resources for virtual exchange	In-service teachers	5.556	.169	5.224	5.887
	Pre-service teachers	5.554	.128	5.302	5.805
Designing meaningful tasks for virtual exchange	In-service teachers	5.418	.204	5.018	5.818
	Pre-service teachers	5.556	.155	5.252	5.860
Integrating virtual exchange projects within the curriculum	In-service teachers	5.538	.217	5.112	5.964
	Pre-service teachers	5.423	.165	5.100	5.747

Table 4: Participants' preferences for training on specific VE areas (detailed)

The three tables above (Table 2-4) relate to whether pre-service and in-service teachers differ with regard to how they assign importance to areas for which they would like to receive additional instruction, tutoring, direction. To explore that we conducted a multivariate analysis of variance (MANOVA) which showed non-significant differences in combined ratings between pre-service and in-service teachers ($F(9, 605) = 1.733$; $p = .078$; Wilk's $\Lambda = .975$). Assumptions for MANOVA were met, so we had an adequate sample size ($n = 615$), no outliers, no multicollinearity (screened with correlation coefficients which were all lower than .40) and Levene's tests for equality of error variances were non-significant.

Additionally, we inspected dependent variables separately, this was confirmed as only 2 out of 10 areas reached significant differences between both groups, these two being *creating a VE*

programme (considered more important by in-service teachers) and *finding topics for VE projects* (seemingly more desired by pre-service teachers).

Teachers' Recognition of Added Value

		Added value of virtual exchange										
		Facilitates authentic communication	**Promotes cultural awareness**	**Flexibility in terms of execution**	**Heightened acquisition of knowledge**	**Use of ICT and remote learning**	**Motivational**	**More available resources**	**Experiential learning**	**I don't know**	**I don't see any added value**	*Total*
In-service teachers	Count	50	51	41	12	7	33	3	4	4	8	213
	%	23.5%	23.9%	19.2%	5.6%	3.3%	15.5%	1.4%	1.9%	1.9%	3.8%	
Pre-service teachers	Count	73	94	41	28	16	28	7	0	12	11	310
	%	23.5%	30.3%	13.2%	9.0%	5.2%	9.0%	2.3%	0.0%	3.9%	3.5%	
Total	Count	123	145	82	40	23	61	10	4	16	19	523
	%	23.5%	27.7%	15.7%	7.6%	4.4%	11.7%	1.9%	0.8%	3.1%	3.6%	

Table 5: Participants' recognition of added value

There is a significant difference between pre- and in-service teachers ($\chi^2 = 20.161$, df. = 9, p = .017) in how they determine added value, when the latter is offered as open-ended cue (Table 5). Further testing of adjusted residual scores ("z-scores") revealed that distinct discrepancies between subgroups are bound to motivational and experiential learning components, which are more pronounced with in-service teachers. Across other categories, results are highly comparable, often differ by merely a few percent points. This coincides with symmetric measures ($C_{CR} = .196$) whose score indicates weak association, raising doubt about the meaningfulness of said dissimilarities in practical contexts.

Reports on Most Challenging Aspects of VE projects*

**The question was asked to all pre-service teachers and only to those in-service teachers who reported not being previously involved in VE.*

		Most challenging in conducting VE projects										
		Time management	**Appropriate equipment, technology…**	**Student motivation & engagement**	**Student proficiency**	**Content selection**	**Finding/Working with a partner**	**Organisation and teacher involvement**	**Class management**	**Curriculum implementation**	**I don't know / not sure**	*Total*
In-service teachers	Count	30	35	8	15	4	18	21	6	12	5	154
	%	19.5%	22.7%	5.2%	9.7%	2.6%	11.7%	13.6%	3.9%	7.8%	3.2%	
Pre-service teachers	Count	33	53	46	65	23	21	39	14	0	13	307
	%	10.7%	17.3%	15.0%	21.2%	7.5%	6.8%	12.7%	4.6%	0.0%	4.2%	
Total	Count	63	88	54	80	27	39	60	20	12	18	461
	%	13.7%	19.1%	11.7%	17.4%	5.9%	8.5%	13.0%	4.3%	2.6%	3.9%	

Table 6: Most challenging aspects of VE projects according to participants

Based on Chi-square test of independence ($\chi^2 = 54.833$, df. = 9, $p < .001$), it is evident that pre- and in-service teachers experience VE-related challenges differently (Table 6). Detailed inspection exposed that in-service teachers define time management and curriculum implementation as more challenging than pre-service teachers, the differences being analysed as significant based on z-score examination. Applying the same tactic, pre-service teachers perceive sustaining pupils'/students' motivation, their diverse proficiency levels and content selection as potentially more problematic for a successful execution of VE project than in-service teachers. However, most of these distinctions can be attributed to their exposure to authentic classroom work. Namely, it is rather clear that pre-service teachers, having never independently considered the curriculum in practical terms, do not perceive any challenges in its application, as they lack experience in addressing its legislative, formative, and educational aspects. Contrarily, employed teachers might be less terrified of heterogenous groups with varied skill-sets as they handle them as part of their everyday obligations, whilst would-be-teachers mainly encounter them during their internship or classroom observations, and though aware of its complexities, often do not develop applicative management strategies. Thus, they internalise the requirement of personalising and differentiating their approaches, yet often do not know how to execute, which may explain their anxiety.

The distinction between these explanations is in the level of familiarity – not knowing at all vs. not knowing how (to). In the case of the former, such areas would not be perceived as a hurdle simply because an individual does not know they exist, whilst in the latter situation the relevant problems might be inflated due to perceived lack of knowledge.

Admittedly, this interpretation attempt is one out of many, yet since the results have moderate to strong practical implications ($C_{CR} = .345$, $p < .001$), we need to be cautious with interpretation of the potential causes.

Received training on VE

		Training about the development of VE		
		YES	**NO**	*Total*
In-service teachers	Count	47	202	249
	%	18.9%	81.1%	
Pre-service teachers	Count	15	406	421
	%	3.6%	96.4%	
Total	Count	62	608	670
	%	9.3%	90.7%	

Table 7: Participants' received training on VE

Having a 2x2 contingency table (Table 7), we applied the Yate's continuity correction, although being aware that it makes little impact in cases where the sample is large and can even cause overcorrection. The adjusted values ($\chi^2 = 41.833$, df. = 1, $p < .001$; $\phi = .255$ $p < .001$) indicate not only that the difference between subgroups is statistically significant but its magnitude of the effect suggests some practical implications. In-service teachers have previously attended or been part of trainings about VE more frequently than pre-service teachers, the sample difference being around 15% (19% vs. 4%).

	Training about the development of VE					
	In-service teachers			**Pre-service teachers**		
	Responses	% of Responses	% of Cases	Responses	% of Responses	% of Cases
Pre-service training	7	9.6%	14.9%	5	12.8%	33.3%
In-service training	7	9.6%	14.9%	9	23.1%	60.0%
An online workshop	27	37.0%	57.4%	9	23.1%	60.0%
A face-to-face workshop	13	17.8%	27.7%	7	17.9%	46.7%
A presentation of good practice	18	24.7%	38.3%	7	17.9%	46.7%
Other	1	1.4%	2.1%	2	5.1%	13.3%
Total Responses	73			39		
Total Cases	47			15		

Table 8: Participants' training about the development of VE

That in-service teachers would be more acquainted with professional development possibilities is not surprising (Table 8). If for no other reason, it is because they have been involved in the education system for a longer time, both as pupils/students and, ultimately, as employees, being altogether more aware of its training possibilities.

When we focus on types of training, the differences are weak, not significant across the whole arrangement (Table 8). However, there is one exception, i.e. in the percent of cases for the *in-service training*. For this type, pre-service teachers have a higher proportion (60.0% vs. 14.9%), signalling an immediate interpretation that they have received more in-service training about VE than their older colleagues, which is nonsensical – how could actual teachers receive less on-the-job training than students. However, if we look at the actual numbers of the participants, we are limited from any such conclusion, because the sample size is too small for anything but purely descriptive summaries that can hardly be anything but referential.

Yet, the reason why pre-service teachers would even select *in-service training* can be concisely explained. Some of them are in the last year, might be already teaching or have been teaching for some time and only lack their thesis defence, still being enrolled in a study programme, thus not fully employed. Additionally, in select cases, one could benefit from an *in-service training* while being on internship as a student. These and similar explanations need to be taken into account before discarding data as invalid.

Future Inclusion of VE into Teaching

Carrying VE project in the future

		No/No I don't have enough knowledge	No, because it's too long and complicated / Prefer the real classroom	Don't know yet (but maybe)	Yes, if I first learn more / If I get support	Yes, a great way to improve students' FL skills	Yes, a good approach towards connecting people, communicate	Yes, because it's easier to ensure participation / Motivate students	Yes, have already tried it with my students / Am doing it currently	Yes / Would like to (general answer)	*Total*
In-service teachers	Count	28	1	21	18	6	4	7	14	38	137
	%	20.4%	0.7%	15.3%	13.1%	4.4%	2.9%	5.1%	10.2%	27.7%	
Pre-service teachers	Count	13	3	23	19	10	9	3	4	30	114
	%	11.4%	2.6%	20.2%	16.7%	8.8%	7.9%	2.6%	3.5%	26.3%	
Total	Count	41	4	44	37	16	13	10	18	68	251
	%	16.3%	1.6%	17.5%	14.7%	6.4%	5.2%	4.0%	7.2%	27.1%	

Table 9: Participants' future inclusion of VE into teaching

There is significant relationship between teacher type and their decision to incorporate VE into their lessons ($\chi^2 = 15.649$, df. = 8, p = .048; $C_{CR} = .250$ p = .048) (Table 9). Additional comparisons of proportions showed only one significant difference between in-service and pre-service teachers, related to the positive response that entails actual past or present experience of conducting a VE programme, where in-service teachers have a higher share (all pairwise comparisons were adjusted using the Benjamini-Hochberg correction). Two comments need to be transparently articulated before issuing any distinct conclusion: (1) we are not operating with exceedingly large samples, meaning that often <20 responses load under a specific

category (which gives ground for reservation); (2) that in-service teachers report a higher degree of preference towards future VE projects based on past or present work with pupils/students than pre-service teachers is logical, since it is not a trait of pre-service teachers to have any extensive contact with students, let alone in VE form.

Although the omnibus test was statistically significant with p = .048, the latter was just over the permissible line of .05, where the only item-item comparison was in itself obvious and thus expected. Admittedly, all used tests answer different questions, but their practical impact is questionable at best.

Involvement in VE projects

Involvement in any VE project

		YES	**NO**	*Total*
In-service teachers	Count	87	188	275
	%	31.6%	68.4%	
Pre-service teachers	Count	66	365	431
	%	15.3%	84.7%	
Total	Count	153	553	706
	%	21.7%	78.3%	

Table 10: Participants' involvement in VE projects

Number of projects involved

Mean Ranks	U	Z	p	effect size estimate
(n = 84) In-service teachers: **88.87** (n = 62) Pre-service teachers: 52.68	1313.00	-5.377	**< .001**	**r = - 0.45**

Table 11: Number of projects participants were involved in

Test results (χ^2 = 25.399, df. = 1, p < .001; ϕ = .193 p < .001) reveal significant association between teacher type and prior VE involvement with more in-service teachers taking part in VE projects in their past (31.6% as opposed to 15.3% belonging to pre-service teachers) (Table 10). Additionally, in-service teachers have a significantly (U = 1313.00, z = -5.377, p < .001) higher average number of VE projects in which they have participated, the corresponding effect size almost reaching the .5 threshold for a large effect (Table 11).

		Description of past VE projects											
		Video calls with another (EU) country	**Only presenting to another person / Communication**	**ERASMUS+**	**eTwinning**	**eMail / Letter correspondence**	**Describing an actual, NOT virtual exchange**	**Focused on content / Examples**	**ERASMUS+ and eTwinning**	**Reporting VE in general**	**Projects other than ERAMUS+/eTwinning**	**National projects**	*Total*
In-service teachers	Count	3	2	4	26	3	1	14	3	20	5	1	82
	%	3.7%	2.4%	4.9%	31.7%	3.7%	1.2%	17.1%	3.7%	24.4%	6.1%	1.2%	
Pre-service teachers	Count	10	8	4	4	15	7	3	0	0	0	0	51
	%	19.6%	15.7%	7.8%	7.8%	29.4%	13.7%	5.9%	0.0%	0.0%	0.0%	0.0%	
Total	Count	13	10	8	30	18	8	17	3	20	5	1	133
	%	9.8%	7.5%	6.0%	22.6%	13.5%	6.0%	12.8%	2.3%	15.0%	3.8%	0.8%	

Table 12: Description of participants' past VE projects

Observing Table 12 with the number of VE experienced participants (n = 153), we can see that there was a drop-out (down to n = 133) in the description of the projects, which can be partly attributed to the optional design and open-ended structure of the question.

Results (Table 12) reveal ($2\hat{\imath}$ = 80.288, df. = 10, $p < .001$, C_{CR} = .718) that in-service teachers report joining substantially separate projects than their younger colleagues with several categories (such as national projects, joint ERASMUS+ and eTwinning endeavours, projects on alternative platforms and similar), though some groups are small, limiting broad conclusions (Table 12).

Pre-service teachers have a significantly (at the p = .05 level) higher proportion of those who recounted projects focused on (just) videoconferencing, communication exercises, email/letter correspondence and quite a lot of those who mistakenly reported about actual exchanges and not virtual ones. In-service teachers frequently mention eTwinning (described by almost one $\frac{1}{3}$ as opposed to $\frac{1}{13}$ of students) and are apparently inclined towards being vague since $\frac{1}{4}$ simply said they "were part of VE". The problem with this general response is that it may in terms of content, unbeknownst to us, overlap with any other category and is thus not particularly reliable.

Types of activities when meeting online

	In-service teachers			Pre-service teachers		
	Responses	% of Responses	% of Cases	Responses	% of Responses	% of Cases
Presenting work to each other	61	30.5%	72.6%	25	18.9%	40.3%
Sharing experience (talking)	57	28.5%	67.9%	39	29.5%	62.9%
Doing structured tasks	31	15.5%	36.9%	22	16.7%	35.5%
Creating something together	30	15.0%	35.7%	20	15.2%	32.3%
Planning future activities	13	6.5%	15.5%	17	12.9%	27.4%
Other	8	4.0%	9.5%	9	6.8%	14.5%
Total Responses	200			132		
Total Cases	84			62		

Table 13: Types of activities when meeting online

Activity types (Table 13) are by and large comparable, the exception is the activity of *presenting work to each other* which seems to be more pronounced with in-service teachers since 72.6% of all involved teachers opted for it (contrary to just 40.3% of students).

What both subgroups had to answer next were questions about organisation and resource use, which was coded on a 5-point scale, where 1 signified *always* and 5 *never* (Table 14). We present session organisations separately, since certain options might be mutually exclusive and thus cannot occur together (e.g., pair-work by default cannot coincide with individual work as these are two distinct possibilities that do not overlap).

Variable	Activity organisation				
	Mean Ranks	U	z	P	effect size estimate
Pair-work	(n = 68) In-service teachers: **64.03** (n = 62) Pre-service teachers: 67.11	2008.00	-.482	.630	
Whole-class	(n = 69) In-service teachers: **58.57** (n = 61) Pre-service teachers: 73.34	1626.00	-2.329	**.020**	**r = - 0.20**
Same-ability groups	(n = 68) In-service teachers: 68.32 (n = 62) Pre-service teachers: **62.41**	1916.50	-.924	.356	
Mixed-ability groups	n = 68) In-service teachers: **58.01** (n = 61) Pre-service teachers: 82.80	1598.50	-2.317	**.020**	**r = - 0.20**
Individual work	n = 68) In-service teachers: 69.18 (n = 60) Pre-service teachers: **59.19**	1721.50	-1.554	.120	

Table 14: Participants' activity organisation

Table 14 shows the variety of classroom organisation during VE projects. For *whole-class* and *mixed-ability* we have found statistically different averages, in both cases in-service teachers being the ones who opt for that organisation type more frequently (due to our choice of coding, lower scores indicate more regular occurrence).

Although we wanted to verify whether our two groups differ along a combination of dimensions, the assumptions of multivariate normality and homogeneity of covariance matrices were not met. Since Box's test was significant at $p < .001$, we could not assume any robustness and disregard violations.

With *resources* (Table 15) we were initially interested in the overall contrast between our subgroups of participants, which is why we have combined every relevant variable into one composite (reliability coefficient of $\alpha = .855$ corroborates this decision).

Resource use

Mean Ranks	U	Z	p	effect size estimate
(n = 69) In-service teachers: **60.67** (n = 61) Pre-service teachers: 70.97	1771.0.	-1.557	**.119**	/

Table 15: Resource use

When interpreted as one complex variable, the results were non-significant. However, when interpreted individually, out of 14 resource types, significant differences between in- and pre-service teachers were found for 5, in all cases in-service teachers appear to have used a particular resource type more frequently (as shown below in Table 16).

Variable	*Resource use*				
	Mean Ranks	U	z	P	effect size estimate
Video communication platforms	(n = 69) In-service teachers: **58.87** (n = 60) Pre-service teachers: 72.05	1647.00	-2.116	**.034**	**r = - 0.19**
Presentation templates	(n = 69) In-service teachers: **58.63** (n = 61) Pre-service teachers: 73.27	1630.50	-2.285	**.022**	**r = - 0.20**
Blogs, posts, padlets	(n = 69) In-service teachers: **56.65** (n = 61) Pre-service teachers: 75.51	1494.00	-2.936	**.003**	**r = - 0.26**
Arts and crafts materials	n = 68) In-service teachers: **57.40** (n = 61) Pre-service teachers: 73.48	1557.00	-2.497	**.013**	**r = - 0.22**
Realia	n = 69) In-service teachers: **53.85** (n = 61) Pre-service teachers: 78.68	1300.50	-3.851	**< .001**	**r = - 0.34**

Table 16: Resource use (detailed)

Conclusion

This report complements the previous two reports (***Pre-service Teachers' Experiences with Virtual Exchange and their Attitudes Towards Implementing Virtual Exchange into the curriculum - A needs analysis report*** and ***In-service Teachers' Experiences with Virtual Exchange and their Attitudes Towards Implementing Virtual Exchange into the curriculum - A needs analysis report***), comparing pre-service and in-service teachers regarding their experiences with virtual exchange (VE) and attitudes toward its integration into the curriculum. It analyses differences in self-assessed competence, perceived challenges, training received, and willingness to implement VE. In-service teachers generally rate their competence higher and recognize VE's benefits more, while pre-service teachers highlight challenges such as student motivation and proficiency. Training on VE is more common among in-service

teachers, and they are more likely to have participated in VE projects. Both groups show interest in future VE inclusion, though in-service teachers demonstrate greater confidence in its execution. All three reports will be of great assistance in planning teacher education modules on VE and in the implementation of VE into the primary curriculum.