education sciences

Article

Tandem Teaching for Quality Physical Education: Primary Teachers' Preparedness and Professional Growth in Slovakia and North Macedonia

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Abstract

Quality Physical Education (QPE) is crucial, yet its delivery at the primary level is often challenged by generalist teachers' inadequate preparedness, a deficit that collaborative tandem teaching can address. This study compared the perceived preparedness of 618 generalist teachers with varied tandem teaching experience in Slovakia and North Macedonia, examining differences linked to the structural model type. Data were collected via a questionnaire assessing self-perceived preparedness across 11 PE domains and the need for continuous professional development. A Chi-square test compared responses between the Slovakian model (rotational sports coaches, co-teaching 1 of 3 weekly lessons) and the North Macedonian model (consistent PE teachers, co-teaching all 3 weekly lessons). Generalist teachers in both countries reported overall high preparedness, but a significant deficiency was identified in working with children with diverse learning needs ($p < 0.01$). North Macedonian teachers, who experience a long-term partnership with a dedicated PE teacher in all weekly PE lessons, reported being significantly better prepared across most domains (e.g., selection of equipment, $p = 0.000$) than Slovakian teachers, who utilize short, rotational partnerships in 1 of 3 weekly lessons. The findings suggest that the structure of the tandem teaching model is a key factor in enhancing generalist teachers' preparedness and professional growth in QPE.

Keywords: team teaching; generalist teachers; physical education teachers; sports coaches; physical education; continuing professional development

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Academic Editor: Ainat Guberman

Received: 1 September 2025
Revised: 13 October 2025
Accepted: 14 October 2025
Published: 18 October 2025

Citation: Luptáková, G., Popeska, B., Ristevska, H., Balga, T., Klincarov, I., & Antala, B. (2025). Tandem Teaching for Quality Physical Education: Primary Teachers' Preparedness and Professional Growth in Slovakia and North Macedonia. *Education Sciences*, *15*(10), 1397. https://doi.org/10.3390/educsci15101397

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1. Introduction

Quality Physical Education (QPE), described by UNESCO (2015) as a 'planned, progressive, inclusive learning experience,' is crucial for developing physically literate individuals with the skills and confidence to maintain an active lifestyle. QPE aims to develop physically literate young people with the skills and confidence to maintain an active lifestyle throughout their lives, bridging the transition from adolescence to adulthood (UNESCO & Loughborough University, 2024). Given that there is no 'single approach' to achieving QPE

(Ofsted, 2022), teacher competence in PE is a key factor in achieving positive student outcomes (Francesco et al., 2019), as the benefits of PE are at least as dependent on the quality of pedagogy as participation in the activities themselves (Ptack et al., 2019). The teacher, therefore, stands as the paramount factor in the effective delivery of QPE at all educational levels (UNESCO & Loughborough University, 2024), especially at the primary stage, where adequate teacher preparation is crucial for effective curriculum implementation and providing truly meaningful student experiences (Alfrey & O'Connor, 2022).

1.1. Challenges in the Delivery of Physical Education at Primary Level

The delivery of Physical Education (PE) in primary schools typically involves a combination of three distinct groups: generalist classroom teachers, specialist PE teachers, and other adults, predominantly sports coaches (Jones & Green, 2015). This varied landscape is highlighted by the latest UNESCO survey, which reveals a higher prevalence of specialist teachers in secondary schools (96%) compared to primary schools (44.7%), with considerable regional variations (UNESCO & Loughborough University, 2024). This varied landscape means that PE is often considered more susceptible to outsourcing than most other subjects (Sperka, 2020), partly due to the availability of external providers (Mangione et al., 2020; Spittle et al., 2022b).

This tendency largely stems from the perceived limitations of generalist classroom teachers in delivering quality PE. Among the most frequently cited reasons for these limitations is inadequate pre-service teacher training (Duncombe et al., 2018; Freak & Miller, 2015; Spittle et al., 2022a; Aliberti et al., 2025; P. Morgan & Bourke, 2008; Truelove et al., 2021; Lu & Lorusso, 2016). This includes limited time allocated to PE during pre-service programs (Duncombe et al., 2018; P. Morgan & Bourke, 2008; Dockerty & Pritchard, 2023; Neutzling et al., 2019), insufficient opportunities for practical PE teaching experience on placement (Randall & Griggs, 2020; Randall, 2023), and the perceived low status and priority of PE within both initial teacher education and in practice (Randall, 2023; Šumanović et al., 2016), which often leads to a lack of interest in PE among pre-service teachers (P. Morgan & Bourke, 2008).

Beyond pre-service concerns, numerous studies identify significant deficiencies in generalist teachers' specialist knowledge and skills (Spittle et al., 2022a; Esposito et al., 2024a, 2024b; Dyson et al., 2016; D'Isanto & D'Elia, 2021a, 2021b). These challenges include a lack of inclusive teaching strategies and difficulties with classroom management specific to PE contexts (D'Elia, 2019a, 2019b; Aparicio-Herguedas et al., 2020; Šumanović et al., 2016; Neutzling et al., 2019), as well as a general lack of confidence and competence in teaching PE compared to other school subjects (Dockerty & Pritchard, 2023; Truelove et al., 2021; P. Morgan & Bourke, 2005, 2008; Randall & Fleet, 2021). Additionally, concerns about student injuries and physical limitations among teachers with health issues (e.g., hypertension, obesity) can further restrict their ability to demonstrate and perform exercises effectively (Neutzling et al., 2019).

Effective pre-service teacher preparation and sustained professional development in PE are widely recognized as key strategies for enhancing pedagogical quality (Armour et al., 2017; Makopoulou, 2018). Effective continuing professional development is characterized as supportive, job-embedded, instructionally focused, collaborative, and ongoing (K. Morgan et al., 2018). Although several studies underscore the importance of continuous professional development for generalist teachers in PE (Petračić, 2023), others demonstrate a prevailing lack of ongoing professional development in the subject (Penney et al., 2013). Despite UNESCO data showing that 70.5% of countries offer in-service training for PE teachers, the frequency of this professional development is a concern. Only 35.6% of countries provide

annual training, with 33% reporting it happens only once every five years (UNESCO & Loughborough University, 2024).

While the preceding discussion highlights challenges faced by generalist teachers in PE, relying solely on external providers also presents significant limitations. Carney and Howells (2008) caution against relying on coaches without formal teacher education qualifications, yet such individuals have consistently been used to replace qualified teachers in delivering PE lessons (A. Smith, 2015). Concerns persist that external providers may lack the necessary teaching qualifications (A. Smith, 2015), as well as adequate pedagogical and classroom management knowledge (Sperka & Enright, 2018; Sperka et al., 2018). Furthermore, they might lack comprehensive knowledge of the school curriculum (Petrie et al., 2014; Dyson et al., 2016), may not align their content with school curricula (Petrie, 2011), might conduct only limited program evaluation (Dyson et al., 2016), and may not possess sufficient familiarity with individual students (Powell, 2015). Ultimately, there is a possibility that the deep subject matter knowledge from external providers could be valued more highly than teachers' pedagogical abilities (Spittle et al., 2022b).

Given the complex nature of educational solutions, both specialist and generalist educators inherently possess unique benefits, strengths, weaknesses, and challenges. Thus, tandem teaching, as a distinct integration of these two approaches, offers the potential to deliver dual advantages to learners, provided it is implemented with careful consideration and precision.

1.2. Tandem Teaching as a Professional Development Strategy

Tandem teaching, often referred to as team teaching or co-teaching, is a collaborative approach where two or more professionals are jointly responsible for instruction within the same educational space. This collaboration includes shared responsibility for designing, planning, delivering, assessing, and supporting all students to enhance their academic and educational success (Beamish et al., 2006; Cook & Friend, 1995). Within school education, tandem teaching models are widely recognized for their potential to improve the quality of teaching and learning processes (Basso & McCoy, 2009), benefiting both learners and teachers (Vangrieken et al., 2015).

Tandem teaching is widely considered a valuable professional development strategy (Walsh, 2022; R. Smith et al., 2020; Mariën et al., 2023), especially for novice teachers (Mariën et al., 2023). It is particularly esteemed for its ability to facilitate informal learning, a key reason for its value in professional growth (Kyndt et al., 2016). Teachers who collaborate can be more effective in their teaching (Sehgal et al., 2017), and this collaboration is proposed as a way to enhance teaching practice (Van Garderen et al., 2012). The theoretical foundation of tandem teaching aligns with the socio-constructivist perspective of learning (Baeten & Simons, 2014). This approach is considered a promising professional development strategy to enhance teachers' knowledge, skills, and attitudes (Merchie et al., 2018), as it encourages them to collaborate, share expertise, and support each other (Walsh, 2022). By working together, educators can share ideas and support (Bashan & Holsblat, 2012), learn new teaching techniques, and gradually refine their own teaching style (Gurger & Uzuner, 2011).

Fostering staff unity is a core tenet of effective tandem teaching (Nordlund, 2003) and a critical prerequisite for generalist teachers to learn and improve through observing and co-working with specialists. While tandem teaching offers numerous potential benefits, this study specifically highlights its capacity to facilitate the professional learning and development of generalist teachers. This approach provides a unique opportunity for them to learn from and collaborate with subject-matter experts—be it a specialized PE teacher or an external sports coach. Such collaborative professional learning models have been shown to facilitate the transfer of effective pedagogical principles and foster sustainable changes in

practice (K. Morgan et al., 2018). Aligning with collaborative professional learning theory, research by Randall and Fleet (2021) underscores the importance of professional socialization through initial teacher education programs, emphasizing opportunities for pre-service teachers to engage with 'knowledgeable others'. Empirically, a study by Whipp et al. (2011) revealed that after six months of involvement in externally provided physical activity programs, generalist teachers reported significant improvements in their skills, knowledge, and confidence, directly attributing these gains to observing and working alongside sport coaches. Consequently, teachers who develop collaborative teaching practices develop professionally, improve their collaborative skills, learn from their partner, and are empowered by reaffirming their pedagogical skills and knowledge (Kirkpatrick et al., 2020).

Conversely, some findings highlight limitations in current partnerships between generalist teachers and external providers. For example, Ní Chróinín and O'Brien (2019) found that teachers' perceptions of external providers possessing greater expertise sometimes led to minimal communication and limited engagement by generalist teachers during lessons taught by external providers. Despite these challenges, the concept of implementing tandem teaching in PE classes receives strong support from both generalist teachers and PE teachers in primary schools in North Macedonia. However, effective implementation requires additional workshops, seminars, and other forms of education (Klincarov et al., 2018). Similarly, McEvilly (2021) reported comparable findings, noting that undergraduate students expressed strong views that PE teachers or sports coaches (often conflated) should be involved in primary PE delivery, with an 'ideal world' scenario involving generalist teachers either not teaching PE or playing a more subordinate role to the PE expert.

1.3. Variations in Tandem Teaching Models in Physical Education

Tandem teaching models are increasingly adopted globally, with various national initiatives reflecting this expansion. This "generalist plus one" approach involves a generalist teacher co-teaching with a PE expert—either a PE teacher or a sports coach—who possesses specific content knowledge. In the United Kingdom, a 2015 study by Jones and Green revealed that over two-thirds of primary schools use a model of pairing a generalist teacher with a sports coach to deliver PE instruction.

In Slovakia, the national project "Coaches in Schools," co-funded by the Ministry of Education, Research, Development and Youth, has been facilitating tandem teaching between generalist teachers and external sports coaches in elementary schools since 2021. Although not mandatory, this model has become highly popular, with schools actively seeking to participate. The 2024/25 school year saw the involvement of nearly 300 primary schools and 200 coaches (Trenéri v škole, n.d.). The project was developed in cooperation with the Czech Republic, where this model is also a popular and widespread practice (Trenéři ve škole, n.d.).

The Slovak tandem teaching program utilizes a coaching rotation model, in which a different coach is assigned to a school every ten weeks. Importantly, the school subject is called Physical and Sport Education and it is mandatory three times a week at the primary level. Sports coaches teach in tandem with the generalist teachers for only one of the three mandated weekly PE lessons. The generalist teacher delivers the remaining two lessons independently. Prior to placement, all coaches are required to complete a three-day introductory workshop (Barák et al., 2021; Luptáková et al., 2025; Balga et al., 2024). This rotation is intentional, as it allows various sports experts to provide specific, in-depth knowledge to the children. The differing personalities and teaching styles of the coaches also mean that some children may prefer one coach over another, which is also true for the collaboration and "chemistry" between the generalist teacher and the coaches.

Additionally, the program includes both male and female coaches, which may be preferred by some students.

Similarly, in North Macedonia, generalist teachers have been teaching in tandem with PE Teachers in grades one through five since 2019, when it was implemented as an experimental project in selected schools. The year after, in 2020 with the changes in the legislation, tandem teaching was implemented at a state level in all schools in North Macedonia and it was gradually implemented at the elementary level of education (1st to 5th grade). Currently, the concept of tandem teaching is implemented in all five grades of classroom teaching. It is a concept unique to Physical and Health Education (the official school subject name), providing a space for generalist teachers and PE teachers to work together. Crucially, the tandem teaching model is used for all three mandated weekly PE lessons, maximizing continuous collaboration. The PE teachers are assigned to the same students and generalist teachers for a full academic year or longer (Popeska, 2022).

While these models share the same "generalist plus one" structure, they differ in weekly intensity and the consistency of their partnerships. Qualls et al. (2025) suggests that consistency is crucial for effective collaboration. If school leaders change teacher pairings every year, the partnerships cannot grow and their overall influence on the system is not as significant.

1.4. Rationale and Aim of the Study

While existing research has explored teacher perceptions of their preparedness for PE, a critical gap remains in the literature regarding how these perceptions change. Specifically, there is limited investigation into how generalist teachers' perceptions of their competence to teach PE are shaped after sustained, long-term experience in tandem teaching with a sports coach or a PE teacher. This makes it a critical area for inquiry, as teachers' initial self-assessments are likely to shift significantly after collaborative practice with a specific-content knowledge expert.

This study compares the self-perceived preparedness of in-service generalist teachers with overall teaching experience and experience in tandem teaching models in Slovakia and North Macedonia, to examine differences associated with the structure of the tandem teaching model (e.g., type of specialist, duration, and weekly intensity of collaboration), and teachers' ongoing professional development needs.

Specifically, this investigation aims the following:

- Investigate generalist teachers' self-perceived level of preparedness for specific pedagogical and organizational aspects of PE lessons, and how they attribute this preparedness to their initial university education, following their experience in a tandem teaching model.
- Assess and prioritize generalist teachers' self-identified needs for future professional development (e.g., workshops, seminars) that will enhance the quality of PE instruction within the tandem teaching model.
- Compare and contrast the findings between the Slovakian (generalist teachers with external sports coaches) and North Macedonian (generalist teachers with internal PE teachers) models to draw conclusions about the impact of each on teacher preparedness and professional development.

2. Materials and Methods

2.1. Study Participants

Participants in this study consisted solely of in-service generalist classroom teachers from public schools in Slovakia and North Macedonia with a minimum of one year of experience in tandem teaching in Physical Education.

In Slovakia, teachers were recruited via email addresses provided by school representatives who applied to the national program "Coaches in Schools." The recruitment was managed by a program coordinator employed at the National Institute of Education and Youth, who is also a team member of this research study. In this program, generalist teachers work alongside a sports coach.

In North Macedonia, generalist teachers work with Physical Education teachers under national legislation for tandem teaching in primary education, and were recruited through some team members of this study research mostly via personal contacts with school personnel (generalist teachers, PE teachers, school principals, etc.).

A total of 618 in-service generalist teachers from North Macedonia and Slovakia participated in the study by completing a questionnaire. The sample was nearly evenly split between the two countries, with 314 generalist teachers from Slovakia (50.8%) and 304 teachers from North Macedonia (49.2%).

As shown in Table 1, the majority of participants were female, accounting for 83.3% (n = 515) of the total sample, while males made up 16.7% (n = 103). The cross-tabulation reveals that there were 10 males and 304 females from Slovakia, while 93 males and 211 females were from North Macedonia.

Table 1. Distribution of study participants by country and gender.

		Country		Total
		Slovakia	**North Macedonia**	
Gender	Male	10	93	103
	Female	304	211	515
	Total	314	304	618

The participants' work experience varied across several categories, as detailed in Figure 1. The largest groups were those with 11 to 20 years of experience (159 teachers, 25.7%) and those with up to 5 years of experience (151 teachers, 24.4%). This was followed by teachers with 21 to 30 years (135 teachers, 21.8%) and more than 30 years of experience (125 teachers, 20.2%). The smallest group had 5 to 10 years of experience (48 teachers, 7.8%).

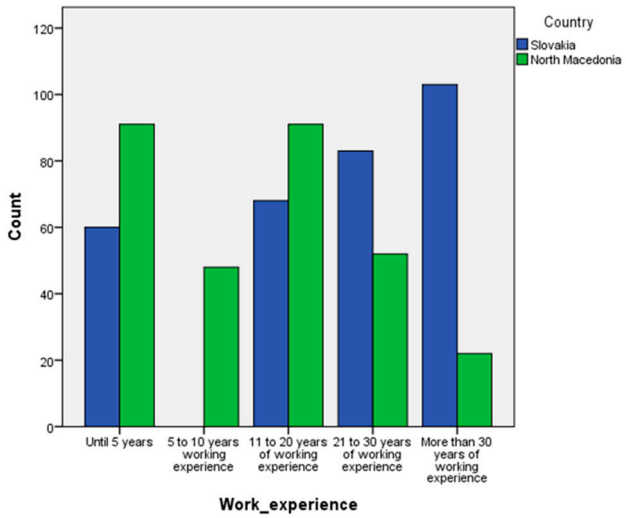

Figure 1. Working experience of study participants by country.

The distribution of work experience also differed by country, as seen in Figure 1. In Slovakia, the largest group of participants had more than 30 years of experience, representing 32.8% (n = 103) of the Slovakian sample. In North Macedonia, the largest groups

were those with up to 5 years of experience (29.9%, $n = 91$) and those with 11 to 20 years of experience (29.9%, $n = 91$). Notably, no participants from Slovakia had 5 to 10 years of work experience.

Regarding their experience working in a tandem, the most common level of experience was one year, reported by 173 teachers (28%) in the total sample, as seen in Figure 2. This was followed by teachers with two years of experience, totaling 148 participants (23.9%). Interestingly, a significant majority of the teachers with one year of tandem experience were from Slovakia (134 teachers), while only 39 were from North Macedonia. For teachers with three years of tandem experience, the numbers were more evenly distributed, with 61 teachers from Slovakia and 66 from North Macedonia. Conversely, participants with four and five years of experience were more prevalent in North Macedonia. Only 16 Slovak teachers had four years of tandem experience, compared to 48 from North Macedonia. This pattern was even more pronounced for teachers with five years of experience, with only 9 from Slovakia but 97 from North Macedonia.

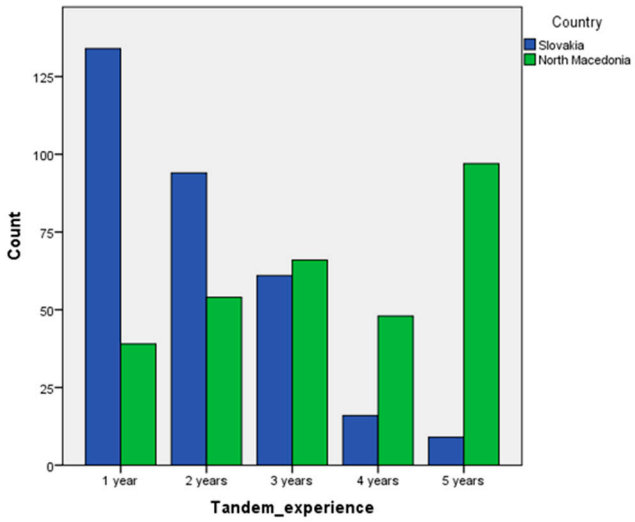

Figure 2. Tandem teaching experience of study participants by country.

The teachers were involved in various grade levels. As shown in Figure 3, the largest group, 202 teachers (32.7%), was involved with the first grade. This was followed by 142 teachers (23.0%) in the second grade, and 111 teachers (18.0%) in multi-grade teaching. The fewest participants, 34 teachers (5.5%), were involved with the fifth grade. A breakdown by country reveals some key differences. In Slovakia, the largest groups of teachers were involved in the first (128 participants) and second grades (95 participants). In contrast, the largest group of North Macedonian teachers was involved in multi-grade teaching (86 participants), followed by first-grade teachers (74 participants). It is also notable that all participants involved with the fifth grade were from North Macedonia, and the majority of teachers involved with multi-grade teaching were also from North Macedonia.

Although providing a city of origin was not a mandatory question, 85 participants (27.1% of the Slovakian sample) and 89 participants (29.3% of North Macedonia sample) provided their city of teaching. For Slovakia, the sample of participants is presenting all eight Slovak regions. Participants from North Macedonia are presenting 11 different cities representing each of the country's eight regions, including the capital and five biggest cities. This broad geographic representation in both countries suggests that the sample is reasonably representative of the distribution of teachers across Slovakia and North Macedonia and indicates the project's widespread establishment. The regional breakdown is detailed in Table 2.

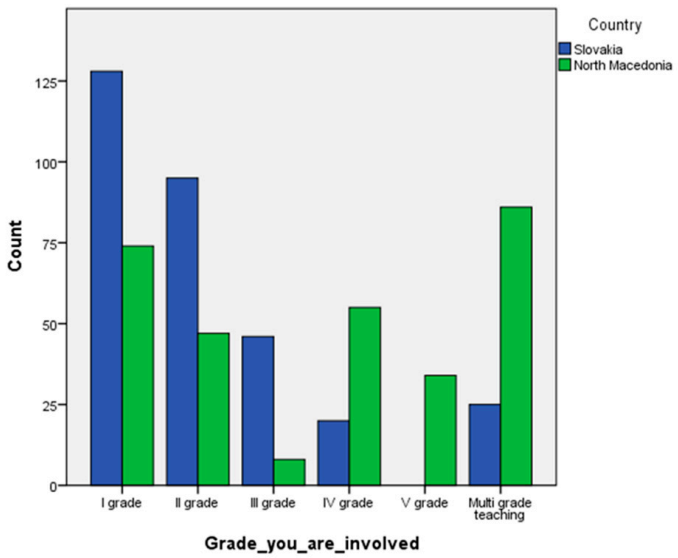

Figure 3. Grade involvement of study participants by country.

Table 2. Regional Representation of Study Participants in Slovakia and North Macedonia.

Slovakia			North Macedonia		
Region	**Teachers (*n* = 85)**	**Percentage (%)**	**Region**	**Teachers (*n* = 89)**	**Percentage (%)**
Košicke region	19	22.35	Vardar region	14	15.73
Žilina region	15	17.65	East Region	11	12.36
Bratislava region	12	14.12	South–west region	9	10.11
Prešov region	11	12.94	South–east region	12	13.48
Banská Bystrica region	10	11.76	Pelagonia region	12	13.48
Nitra region	7	8.24	Polog region	5	5.62
Trenčín region	6	7.06	North–east region	7	7.87
Trnava region	5	5.88	Skopje region	19	21.35

Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki. Ethical approval for the study protocol and data collection procedures was obtained from the Ethics Committee at the Faculty of Physical Education and Sport, Comenius University in Bratislava, Slovakia (protocol code 10/2024, 21 June 2024). All participants were informed about the purpose of the study, their rights, and the confidentiality of their responses before completing the questionnaire. Informed consent was obtained from all participants, who were required to agree to the terms outlined at the beginning of the online questionnaire before proceeding. Their data were anonymized to ensure their privacy and confidentiality.

2.2. Data Collection

The data for this study were collected using a questionnaire distributed to generalist teachers via Google Forms between 16 June and 11 July 2025, in both countries, purposely administered at the end of the school year to capture reflections based on sustained experience.

The questionnaire was originally developed in North Macedonia in the Macedonian language, then translated to English, and finally to Slovak for distribution in Slovakia. For this paper, questions focusing on generalist teacher preparedness and professional development were selected for analysis. The questionnaire was developed to collect data on various aspects of generalist teachers' involvement in tandem PE lessons. For this study, data were analyzed from several key questions with different structures. Question 3 was a multi-item scale designed to measure teachers' self-perceived preparedness for 11 distinct aspects of PE lessons, such as "Use of movement games" and "Work with children with diverse learning needs." For each item, respondents selected from a Likert-type scale with four options, ranging from "I was completely prepared" to "I was not prepared well." Question 10 was a binary-choice question that asked teachers about their need for additional professional development. Lastly, question 10.1 was an open-ended follow-up question allowing participants to specify preferred topics.

Validity and Reliability

The questionnaire was developed ad hoc for this study, as no standardized instrument was available to cover the unique pedagogical and structural aspects of tandem teaching across both national contexts. We acknowledge that the instrument did not undergo formal psychometric or external standardization. However, to ensure the instrument's validity and reliability:

1. Expert Review for Content Validity: The questionnaire was developed and reviewed by a team with expertise in physical education and education, which functioned as an internal expert committee. This ensured the instrument was precisely tailored to capture a comprehensive and relevant range of topics (content validity) related to tandem teaching. It used clear, specific language to minimize ambiguity. For example, the questions about teacher preparedness (Question 3) included detailed options on a Likert-type scale, ranging from "I was completely prepared" to "I was not prepared well."
2. Linguistic Equivalence for Reliability: A formal back-translation procedure (Macedonian $\rightarrow$ English $\rightarrow$ Slovak) was performed. This was a critical step in ensuring semantic and conceptual equivalence across the different language versions, thereby supporting the reliability and consistency of the instrument across both countries.

2.3. Data Analysis

The data were evaluated using both descriptive and inferential statistical methods. First, descriptive statistics were used to summarize the frequency and percentage distributions of participant responses for each question. To examine potential differences between groups, a Chi-square test of independence was conducted. This test was chosen to determine whether there was a statistically significant association between the categorical variable of the country (Slovakia or North Macedonia) and the responses to the specific questions selected for analysis (questions 3, 10 and 10.1). The significance level was set at $\alpha = 0.05$. For any statistically significant findings from the Chi-square tests, Cramer's V was calculated to determine the strength of the association between the variables. This coefficient provides a value between 0 and 1, with higher values indicating a stronger relationship. All statistical analyses were performed using IBM SPSS Statistics for Windows Version 21.0.

3. Results

The self-perceived preparedness of in-service teachers engaged in tandem teaching models in Slovakia and North Macedonia was investigated for 11 different aspects of

teaching PE. These aspects were categorized across four primary areas: instructional design and activity planning (e.g., selection of activities and content, use of movement games, equipment, and organizational forms); pedagogical and developmental approach (e.g., knowledge for movement skills, age-appropriate pedagogical approaches, and focus on overall development); communication and emotional support (e.g., motivation, age-appropriate communication, and socio-emotional climate); and inclusive and adaptive practices. Teachers were asked to indicate whether they felt: (a) completely prepared, (b) partially prepared, (c) not well prepared, (d) had previous experience in similar areas, or (e) other. Teachers' perceptions of their preparedness across 11 aspects of teaching PE are presented in Table 3.

Table 3. Distribution of responses for self-perceived preparedness for teaching PE by country and overall sample (%).

Variable	Category	Slovakia	North Macedonia	Overall
		***n* (%)** **314 (50.8)**	***n* (%)** **304 (49.2)**	***n* (%)** **618 (100)**
1. Use of movement games at PE classes	Completely prepared	124 (39.5)	150 (49.3)	274 (44.3)
	Partially prepared	136 (43.3)	105 (34.5)	241 (39.3)
	Not well prepared	20 (6.4)	29 (9.5)	49 (7.9)
	I had previous experience in similar areas	33 (10.5)	20 (6.6)	53 (8.6)
	Other	1 (0.3)	0 (0)	1 (0.2)
2. Selection of activities and contents appropriate for children's age and abilities	Completely prepared	132 (42)	168 (55.3)	300 (48.5)
	Partially prepared	137 (43.6)	90 (29.6)	227 (36.7)
	Not well prepared	25 (8)	24 (7.9)	49 (7.9)
	I had previous experience in similar areas	19 (6.1)	22 (7.2)	41 (6.6)
	Other	1 (0.3)	0 (0)	1 (0.2)
3. Selection of equipment appropriate for children's age and abilities	Completely prepared	116 (36.9)	174 (57.2)	290 (46.9)
	Partially prepared	143 (45.5)	87 (28.6)	230 (37.2)
	Not well prepared	35 (11.1)	24 (7.9)	59 (9.5)
	I had previous experience in similar areas	19 (6.1)	19 (6.3)	38 (6.1)
	Other	1 (0.3)	0 (0)	1 (0.2)
4. Choosing organizational forms according to students' age and abilities	Completely prepared	136 (43.3)	175 (57.6)	311 (50.3)
	Partially prepared	127 (40.4)	90 (29.6)	217 (35.1)
	Not well prepared	24 (7.6)	21 (6.9)	45 (7.3)
	I had previous experience in similar areas	25 (8.0)	18 (5.9)	43 (7.0)
	Other	2 (0.6)	0 (0)	2 (0.3)
5. Pedagogical approaches appropriate for working with children at younger age	Completely prepared	153 (48.7)	187 (61.5)	340 (55.0)
	Partially prepared	121 (38.5)	78 (25.7)	199 (32.2)
	Not well prepared	16 (5.1)	19 (6.3)	35 (5.7)
	I had previous experience in similar areas	21 (6.7)	20 (6.6)	41 (6.6)
	Other	3 (1.0)	0 (0)	3 (0.5)

Table 3. *Cont.*

Variable	Category	Slovakia	North Macedonia	Overall
		***n* (%)** **314 (50.8)**	***n* (%)** **304 (49.2)**	***n* (%)** **618 (100)**
6. Communication with children in early school period	Completely prepared	178 (56.7)	183 (60.2)	361 (58.4)
	Partially prepared	89 (28.3)	80 (26.3)	169 (27.3)
	Not well prepared	21 (6.7)	23 (7.6)	44 (7.1)
	I had previous experience in similar areas	22 (7.0)	18 (5.9)	40 (6.5)
	Other	4 (1.3)	0 (0)	4 (0.6)
7. Movement skills, abilities and needs of children in early-school period	Completely prepared	161 (51.3)	182 (59.9)	343 (55.5)
	Partially prepared	116 (36.9)	87 (28.6)	203 (32.8)
	Not well prepared	13 (4.1)	18 (5.9)	31 (5.0)
	I had previous experience in similar areas	19 (6.1)	17 (5.6)	36 (5.8)
	Other	5 (1.6)	0 (0)	5 (0.8)
8. Approach focused on overall development, not just on development of movement skills	Completely prepared	139 (44.3)	169 (55.6)	308 (49.8)
	Partially prepared	131 (41.7)	99 (32.6)	230 (37.2)
	Not well prepared	22 (7.0)	20 (6.6)	42 (6.8)
	I had previous experience in similar areas	19 (6.1)	16 (5.3)	35 (5.7)
	Other	3 (1.0)	0 (0)	3 (0.5)
9. Work with children with diverse learning needs	Completely prepared	79 (25.2)	91 (29.9)	170 (27.5)
	Partially prepared	119 (37.9)	120 (39.5)	239 (38.7)
	Not well prepared	81 (25.8)	76 (25.0)	157 (25.4)
	I had previous experience in similar areas	24 (7.6)	17 (5.6)	41 (6.6)
	Other	11 (3.6)	0 (0)	11 (1.8)
10. Motivation and encouragement of students	Completely prepared	156 (49.7)	178 (58.6)	334 (54.0)
	Partially prepared	107 (34.1)	84 (27.6)	191 (30.9)
	Not well prepared	21 (6.7)	20 (6.6)	41 (6.6)
	I had previous experience in similar areas	25 (8.0)	22 (7.2)	47 (7.6)
	Other	5 (1.6)	0 (0)	5 (0.8)
11. Maintaining the socio-emotional climate in the class during PE lessons	Completely prepared	146 (46.5)	177 (58.2)	323 (52.3)
	Partially prepared	116 (36.9)	89 (29.3)	205 (33.2)
	Not well prepared	20 (6.4)	19 (6.3)	39 (6.3)
	I had previous experience in similar areas	23 (7.3)	19 (6.3)	42 (6.8)
	Other	9 (2.9)	0 (0)	9 (1.5)

Overall, the majority of respondents reported feeling "completely prepared" and "partially prepared," with slight differences between countries across various items indicating possible differences in subject-specific knowledge foundation resulting from initial studies. A smaller proportion indicated "not well prepared" or "previous experience," while the "other" response was selected by very few participants.

Across most items related to instructional design and activity planning, the majority of respondents reported being "completely prepared" and "partially prepared," suggesting a need for further self-directed learning. The proportion of teachers who felt "completely

prepared" ranged from 44% (use of movement games at PE classes) to 50.3% (choosing appropriate organizational forms). Similarly, the proportion of teachers who felt "partially prepared" ranged from 35.1% (choosing appropriate organizational forms) to 39.3% (use of movement games). The highest percentage for the category "not well prepared" was noted for selection of age-appropriate equipment (9.5%), while the option "previous experience in similar areas" was less selected, varying from 6.1% (selection of equipment) to 8.6% (use of movement games).

Across the items related to pedagogical and developmental approach, as shown in Table 3, the highest proportion of respondents who felt "completely prepared" was observed for knowledge of movement skills and lesson planning (55.5%), followed by age-appropriate pedagogical approaches (50%) and focus on overall development (49.8%). Among teachers from both countries, "completely prepared" was the most frequently selected option across these three items, ranging from 44.3% to 51.3% for Slovak teachers and 55.6% to 61.5% for teachers from North Macedonia. Only a small number of participants selected "not prepared well" and "previous experience" across all these items (<7%).

The items investigating communication and emotional support included the following: communication with children in the early school period, motivation and encouragement, and maintaining socio-emotional climate during PE lessons. As shown in Table 3, the highest proportion of respondents reported "completely prepared" for communication with children in the early school period (58.4%), followed by motivation and encouragement (54%) and maintaining socio-emotional climate (52%). The percentage of "partially prepared" varied from 28% (communication) to 36.9% (socio-emotional climate) in Slovak teachers, and from 26.3% (communication) to 29.3% (socio-emotional climate) for teachers in North Macedonia, respectively. Across these three items, only a small number of participants selected "not well prepared" and "previous experience" (<8%).

Among the items investigated, the greatest variations were noted for the item related to inclusive and adaptive practices. Specifically, 27.5% of teachers reported feeling "completely prepared" to work with children with diverse learning needs (25.2% of Slovak teachers and 29.9% of teachers from North Macedonia); 38.7% reported being "partially prepared" (38% Slovak, 39.5% teachers from North Macedonia); 25.4% were "not well prepared," and 6.6% indicated they had previous experience in this role. The majority of respondents reported being either "partially prepared" or "not well prepared," which collectively suggests a strong need for further self-directed learning or formal professional development in the area of work with children with diverse learning needs.

Overall, the presented findings suggest a consistent trend where participants recognized the value of their initial studies but highlighted a need for additional self-directed learning in most areas.

Differences in the self-perceived level of preparedness for various aspects of teaching PE between teachers in Slovakia and North Macedonia were analyzed using the Chi-square test, while the effect size was estimated using Cramer's V test. These results are presented in Table 4.

As presented in Table 4, Chi-square tests revealed statistically significant differences in response distributions across nine of eleven items. The most significant differences were observed in relation to selection of equipment appropriate for children's age and abilities ($\chi^2 = 28.12$, df = 4, $p = 0.000$, V = 0.213); pedagogical approaches ($\chi^2 = 15.82$, df = 4, $p = 0.003$, V = 0.160) and maintaining the socio-emotional climate in the class during PE lessons ($\chi^2 = 15.78$, df = 4, $p = 0.003$, V = 0.160). While these results were statistically significant, the strength of association was weak, indicating that practical differences between groups were modest. In selection of equipment appropriate for children's age and ability, teachers from North Macedonia reported sufficient knowledge and felt completely prepared to do

so effectively during tandem teaching, while the majority of teachers from Slovakia felt partially prepared and indicated a need for additional self-learning. In regard to knowledge for age-appropriate pedagogical approaches (48.7% for Slovak teachers and 61.5% for teachers from North Macedonia) and maintaining a socio-emotional climate during PE lessons (46.5% for Slovak teachers and 58.2% for teachers from North Macedonia), the largest proportion of responses in both groups fell into the "completely prepared" category. This suggests that despite statistical differences, overall patterns of preparedness were similar, implying that other factors, such as the tandem teaching structure, influence these aspects of teaching.

Table 4. Differences between teachers from Slovakia and North Macedonia.

Variable	Pearson Chi-Square (N)	df	*p*-Value	Cramér's V	Association Strength
1. Use of movement games at PE classes	12.138 (618)	4	0.016	0.140	Weak
2. Selection of activities and contents appropriate for children's age and abilities	15.133 (618)	4	0.004	0.156	Weak
3. Selection of equipment appropriate for children's age and abilities	28.131 (618)	4	0.000	0.213	Weak
4. Choosing organizational forms according to students' age and abilities	14.381 (618)	4	0.006	0.153	Weak
5. Pedagogical approaches appropriate for working with children at younger age	15.815 (618)	4	0.003	0.160	Weak
6. Communication with children in early school period	4.879 (618)	4	0.300	0.089	Weak
7. Movement skills, abilities and needs of children in early-school period	11.187 (618)	4	0.025	0.135	Weak
8. Approach focused on overall development and not just on development of movement skills	10.568 (618)	4	0.032	0.131	Weak
9. Work with children with diverse learning needs	13.047 (618)	4	0.011	0.145	Weak
10. Motivation and encouragement of students	9.275 (618)	4	0.055	0.123	Weak
11. Maintaining the socio-emotional climate in the class during PE lessons	15.780 (618)	4	0.003	0.160	Weak

Weak (small) effect 0.10–0.29; Moderate (medium) 0.30–0.49; Strong (large effect) $\geq$ 0.50.

Less strong but still statistically significant differences were obtained in response distributions for items: use of movement games at PE classes (χ^2 = 12.14, df = 4, p = 0.016, V = 0.140); selection of age appropriate content and activities (χ^2 = 15.13, df = 4, p = 0.004, V = 0.156); choosing organizational forms according to students' age and abilities (χ^2 = 14.38, df = 4, p = 0.006, V = 0.153); movement skills, abilities and needs of children in early-school period (χ^2 = 11.19, df = 4, p = 0.025, V = 0.135); focus on overall development (χ^2 = 10.57, df = 4, p = 0.032, V = 0.131); and work with children with diverse learning needs (χ^2 = 13.05, df = 4, p = 0.011, V = 0.145). The values of Cramer's V indicate a weak effect size and a modest practical association. In terms of practical implications, the results indicate that teachers from Slovakia reported a greater need for additional self-learning when it comes to the use of movement games at PE classes and selection of age-appropriate and ability-related activities and contents for children. This is evidenced by the fact that 43.3% (movement games) and 43.6% (selection of activities) chose "partially prepared," compared to their colleagues from North Macedonia where a greater proportion of teachers chose "completely prepared" (49% for movement games; 55.3% for selection of age-appropriate

contents) and reported sufficient knowledge for these aspects of PE teaching. Regarding the focus on overall development, inclusive work with children, and selection of proper organizational forms, both groups of teachers reported sufficient knowledge, with the highest proportion of respondents choosing "completely prepared" followed by "partially prepared" and then "not well prepared" or "had a previous experience."

Statistically significant differences were identified for the aspect of working with children with diverse learning needs ($\chi^2 = 13.05$, df = 4, $p = 0.011$, V = 0.145), demonstrating differences in the distribution of responses between the two countries. In this case, the majority of teachers felt "partially prepared" (37.9% in Slovakia and 39.5% in North Macedonia), followed by 25% in Slovakia and 29.9% in North Macedonia who felt "completely prepared," and 25.8% in Slovakia and 25% in North Macedonia who faced difficulties and felt "not well prepared" for inclusive work in PE. These findings openly and directly point out the need for additional forms of knowledge and learning for teachers on this topic, as well as the need to provide different manners of support for both teachers and students in creating an inclusive and adaptable PE context.

Following the presented results in Table 4, in only two items—communication with children in early school period ($\chi^2 = 4.88$, df = 4, $p = 0.300$, V = 0.089) and motivation and encouragement of students ($\chi^2 = 9.28$, df = 4, $p = 0.055$, V = 0.123)—no statistically significant differences and no reliable association were found. This indicates no reliable association between the education perceived during initial education studies in different countries and the perceived ways of communicating with children and motivating them within PE classes during tandem teaching.

In addition to identifying the self-perceived preparedness of in-service teachers engaged in tandem teaching models in Slovakia and North Macedonia, we were also interested in their opinions and needs for additional workshops or seminars as a part of their CPD (Continuous Professional Development) program that will support their work in PE tandem and improve the quality of their teaching. The suggested question was a binary-choice question, followed by an open-ended follow-up question allowing participants to specify preferred topics. Respondents' answers are presented in Table 5.

Table 5. Distribution of responses (*n*/%) by country for additional workshops and seminars for tandem teaching.

	Options	**Slovakia** ***n*** **(%)**	**North Macedonia** ***n*** **(%)**	**Total** ***n*** **(%)**
Do you think that additional workshops or seminars that will improve the quality of teaching are needed for teachers included in the tandem?	Yes	41 (13.06)	85 (27.96)	126
	Maybe	54 (17.20)	71 (23.36)	125
	No	83 (26.43)	75 (24.67)	158
	I'm not sure	136 (43.31)	73 (24.01)	209
		314 (50.8)	304 (49.2)	618

$\chi^2 = 36.92$, df = 3, $p = 0.000$, Cramer's V = 0.244.

Following the data presented in Table 5, the greatest proportion of teachers from Slovakia were uncertain about the actual need for additional workshops and seminars for improving the quality of their teaching (43%). This group was followed by 26% who did not need such forms of CPD, and 17% and 13% who expressed a positive attitude toward training. Compared to them, teachers from North Macedonia were more divided in their opinions: 28% were in favor of attending seminars and workshops, 25% were against, and the remaining proportion of respondents were uncertain. Following the Chi-square test results, a statistically significant difference emerged between Slovak teachers and teachers from North Macedonia regarding their perceptions of the need for CPD programs

that support tandem teaching ($\chi^2(3) = 36.92$, $p < 0.001$, V = 0.24). These results suggest that Slovak teachers were more uncertain about the need for professional development, whereas teachers from North Macedonia expressed clearer support for additional training opportunities. The strength of the association was weak (V = 0.24).

Analysis of the open-ended question, which requested potential topics for workshops and seminars aimed at enhancing generalist teachers' professional development and the quality of tandem teaching in PE, identified several thematic groups. Out of the total sample of 618 participants, 46 teachers from Slovakia and 79 teachers from North Macedonia provided suggestions for topics they considered both interesting and useful. The grouped themes, based on teacher responses from both countries, are presented in Table 6.

Table 6. Topic for workshops and seminars for improving the quality of tandem teaching in PE.

	Topic	Content
Overarching topics	Work with Specific Student Groups	Working with students with diverse learning needs (gifted abilities, learning disabilities, special educational needs).
	Methodology and Didactics	Improving teaching methods—learning how to create more interactive lessons, manage larger classes effectively, managing PE classes in small spaces or in the classroom, managing PE classes with limited resources and equipment reflection, create a positive and safe classroom environment, new approaches in PE lessons
	Communication and Collaboration	Improving communication skills of teachers, learning communication strategies between tandem teachers, with students and parents, strategies for effective teamwork with colleagues.
	Specific Subject Matters and holistic learning through PE	Workshops tailored to integrate learning content between PE and other specific subjects (Math, Languages, Music, Art), focusing on innovative teaching strategies for those disciplines
		Country-specific topics
Slovakia	Student Well-being and Mental Health	Managing stress, addressing burnout in both students and teachers, and supporting students with mental health challenges
	Digital Skills and Technology	Focus on using apps and AI tools, creating effective teaching materials, and using various digital platforms.
North Macedonia	Movement games and sport-based activities	Age-appropriate movement games for different phases of PE lessons, classroom-based movement games, outdoor based movement games and activities, cooperation games, fun and engaging activities
	Efficient organization of tandem teaching	Seminars for efficient organization of tandem teaching, distribution of tasks and responsibilities, effective communication between teachers.
	New approaches in teaching PE	Workshops and seminars for updates with new trends in teaching PE and sport pedagogy, experiences from other countries and teachers, practical workshops with teachers
	Supporting materials	Design of manuals, handbooks and other teaching materials and handbooks that will support teachers work in the tandem

The overarching topics are those suggested by teachers in both countries and include: Work with children with diverse learning needs; Methodology and didactics; Communication and collaboration in PE; and Specific subject matters and holistic learning through PE.

Additional topics indicated by Slovak teachers relate to student health and well-being, with an emphasis on mental health, and the use of digital skills and technology in PE teaching. These topics align with current societal trends and address challenges relevant to students' everyday lives, potentially impacting both students and teachers.

Topics suggested by teachers in North Macedonia focused more on addressing practical challenges faced in the everyday PE context, aiming to directly support them during daily teaching, improve their work, and provide quality PE lessons.

While the main findings are summarized here, detailed frequency distributions and cross-country comparisons for all survey items are provided for visual inspection in the figures located in Appendix A (Figures A1–A12).

4. Discussion

4.1. Main Findings

Research consistently suggests that generalist teachers' delivery of quality PE is often hindered by insufficient knowledge and skills gained during initial teacher education (ITE) (Duncombe et al., 2018; Spittle et al., 2022a; Esposito et al., 2024a, 2024b). However, a key finding of our study runs counter to this generalization: generalist teachers in both Slovakia and North Macedonia reported a less critical overall self-perception of preparedness than the literature might suggest, frequently rating themselves as "partially" or "completely" prepared in ten of eleven areas. This result highlights the potential of tandem teaching as a potent, job-embedded professional development strategy that may moderate or compensate for these initial weaknesses (Walsh, 2022; R. Smith et al., 2020). Similar to the findings of Whipp et al. (2011), who noted significant improvements in generalist teacher confidence after working alongside sport coaches, our data suggests that ongoing collaboration elevates self-reported competence.

Of the eleven areas assessed, only one was consistently identified as insufficient in both countries: working with children with diverse learning needs. A significant portion of teachers—26% in Slovakia and 25% in North Macedonia—reported feeling inadequately prepared, highlighting a shared systemic weakness in initial teacher education across both contexts. The deficit was significantly more pronounced in Slovakia ($p < 0.01$, Cramer's V = 0.145), indicating a statistically significant, albeit small, effect size. This aligns with research that identifies a lack of inclusive teaching strategies as a significant challenge for generalist teachers (D'Elia, 2019a, 2019b; Aparicio-Herguedas et al., 2020). For the remaining ten domains, teachers in both countries reported a high degree of preparedness, either feeling completely prepared or partially prepared. This finding—where self-reported preparedness is high despite known ITE shortcomings—underscores the need to examine the efficacy of the specific national tandem teaching models (as shown in Section 4.2). A particularly positive finding was the strong self-perception of preparedness in communication with young children, the only domain that showed no statistically significant difference between the two countries ($p = 0.300$, Cramer's V = 0.089), suggesting a shared strength in this foundational skill across both contexts.

4.2. Cross-Country Differences

While a lack of preparedness for special needs was a shared concern, a more detailed analysis reveals significant differences between the two countries in other domains. Despite the shared strength in communication, North Macedonian generalist teachers consistently reported feeling significantly better prepared to teach PE than their Slovakian counterparts in all other assessed areas. In Slovakia, teachers' initial university education often left them feeling only partially prepared, necessitating additional self-learning. For example, in the area of selecting appropriate equipment, the number of teachers who felt partially prepared exceeded those who felt completely prepared. This trend aligns with existing literature highlighting how inadequate pre-service training can lead to deficiencies in generalist teachers' specialist knowledge (Spittle et al., 2022a; Esposito et al., 2024a, 2024b; Dyson et al., 2016; D'Isanto & D'Elia, 2021a, 2021b).

In stark contrast, North Macedonian teachers frequently reported feeling "completely prepared" for many aspects of PE. The most significant differences were observed in the following areas: selection of equipment (p = 0.000, Cramer's V = 0.213), pedagogical approaches (p = 0.003, Cramer's V = 0.160), and maintaining the socio-emotional climate (p = 0.003, Cramer's V = 0.160). These significant differences prompt an exploration into the potential causal factors, including the quality of pre-service teacher training in distinct contexts, the structure of the tandem teaching models (including weekly volume and consistency of partnership), and cumulative teaching experience.

4.3. Casual Factors: Tandem Teaching Structure and Experience

These significant differences prompt an exploration into the potential causal factors. The data reveals that, while Slovakian generalist teachers are at the higher end of overall professional experience (Figure 1), their confidence in teaching PE is lower, which contrasts sharply with the higher self-reported preparedness of the North Macedonian cohort. This apparent paradox is likely rooted in two complementary factors: Historical initial teacher education deficit and the structure of distinct tandem teaching modes.

The low confidence among the most experienced Slovakian teachers (32.8% having 30+ years of general teaching experience) is likely a generational effect rooted in the historical quality and low prioritization of PE within their initial teacher education programs several decades ago. For this cohort, inadequate pre-service training created fundamental gaps in specialist knowledge that have persisted throughout their careers (Spittle et al., 2022a). Additionally, higher age of teachers may result in less motivation to teach PE, and putting less importance to PE as a school subject.

The cumulative years of experience with tandem teaching, along with the distinct tandem teaching models in each country, appear to be a major factor for the differences in perceived preparedness. The data reveals that experience levels vary dramatically between the two countries. In Slovakia, a significant majority of generalist teachers have very limited experience with tandem teaching (over 72% have only one to two years), which may explain their lower self-reported preparedness. In contrast, North Macedonia has a far more cumulative and widespread distribution of experience, with a substantial portion (31.9%) reporting five years of tandem teaching. This greater experience provides a plausible reason for their higher self-reported preparedness, as they have had more time to apply and master the skills required for PE lessons. This finding suggests that a teacher's comfort and competence in a tandem teaching model are directly correlated with their years of experience (Simons et al., 2020; Kirkpatrick et al., 2020).

While generalist teachers teach PE across all primary grades, the "Coaches in Schools" program is primarily focused on Grades 1 and 2 precisely due to the recognized importance of Fundamental Movement Skills and Physical Literacy development in these initial years. This program inadvertently concentrated our Slovakian cohort in the lowest grades (Figure 3). The concentration of less-confident Slovakian teachers in the youngest grades, combined with their structural lack of sustained professional support, poses a critical long-term public health risk that extends beyond teacher development.

The specific structure of the tandem teaching models also plays a crucial role. The core distinction lies in the type of the PE expert (PE teacher versus sport coach), weekly amount of tandem teaching in PE (all 3 classes versus 1 of 3 classes), and the longevity of the collaboration (school year(s) versus 10 weeks). In Slovakia's "Coaches in Schools" project, a sports coach rotates schools every ten weeks. This short, rotational schedule offers a limited and fragmented learning experience. Crucially, this rotational nature directly prevents the formation of long-term partnerships, which research has shown is essential for professional growth (Qualls et al., 2025; Strogilos & Tragoulia, 2013). Without

a consistent partnership, the system is never truly established, hindering the development of collaborative instructional practices.

In contrast, the North Macedonian model, which pairs generalist teachers with an internal, dedicated PE teacher, provides a unique opportunity for job-embedded learning and professional socialization (Randall & Fleet, 2021). The generalist teacher works with the same partner for an extended period, allowing for sustained collaboration. This consistent partnership provides a more stable and in-depth learning environment, enabling generalist teachers to acquire and refine a broader range of pedagogical skills. This sustained collaboration within all PE lessons a week in North Macedonia appears to be a key reason why their teachers report higher levels of preparedness.

Furthermore, this study's findings highlight the limitations of relying on external providers like sports coaches, who may lack formal teaching qualifications, as well as adequate pedagogical and classroom management knowledge (A. Smith, 2015; Sperka & Enright, 2018). The North Macedonian model, which pairs generalist teachers with internal PE teachers (practically colleagues from the same school), appears to mitigate these weaknesses by providing a model of an expert who possesses both extensive subject matter knowledge and strong pedagogical skills. This is supported by Aparicio-Herguedas et al. (2020), who found that while different specialists bring distinct strengths, their overall teaching and learning processes can be equally effective. This suggests that the North Macedonian model, by leveraging a sustained partnership with a PE teacher, may be a highly effective intervention that addresses the weaknesses often found in generalist teacher QPE delivery.

However, it is important to acknowledge that sport coaches also offer unique benefits that can enrich the PE experience. Schools often outsource to gain access to specific expertise that generalist teachers may not have (Williams & Macdonald, 2015). This is particularly relevant in primary schools where generalist teachers often have limited specialist training in PE (Dyson et al., 2016; Penney et al., 2013; Spittle et al., 2022b). Sport coaches can also offer a greater variety and diversity of activities that schools might not otherwise provide (Dyson et al., 2016), potentially improving student experience, motivation, and participation (Whipp et al., 2011). Moreover, external providers through coaches can serve as a valuable short-term solution for schools with contextual constraints like limited teacher training or facilities (Randall, 2023).

To conclude, generalist teachers hold a rightful and central role in teaching all primary school subjects, a position supported by their strong pedagogical foundation (Nioda & Tagare, 2024) and recognized strengths, including their versatility in teaching approaches (Dockerty & Pritchard, 2023), expertise in utilizing play and body expression as didactic resources (Aparicio-Herguedas et al., 2020), and capacity to expand instructional adaptation skills (Beamish et al., 2006). However, tandem teaching emerges as an effective professional development strategy that mitigates their subject-specific weaknesses and skill gaps. This collaborative approach simultaneously enhances the generalist teacher's capacity while reaffirming the specialized role of the PE expert to ensure students receive high-quality PE (QPE) during their crucial early school-age years. The tandem model, therefore, acts as a crucial supplemental pathway to meet professional standards in a context where dedicated specialists are scarce. Particularly, the North Macedonian model of tandem teaching is a form of "Co-Professionalization." It is not about replacing the specialist, but about strategically leveraging the specialist's expertise (professionalization) to build the capacity of the non-specialist. This upskills the workforce without lowering the standard, as the certified PE teacher remains the central standard-bearer and the key mechanism of continuing professional development. The implications of these findings, along with the

study's limitations and directions for future research, are synthesized in the Conclusion (Section 5).

5. Conclusions

This study investigated the impact of two distinct tandem teaching models on the perceived preparedness of generalist primary teachers in Slovakia and North Macedonia, providing evidence for effective strategies to enhance Quality Physical Education (QPE). The research yields three core findings:

- Tandem Teaching as Job-Embedded CPD: Generalist teachers in both countries reported overall moderately high perceived competence across most PE domains. This finding challenges the widespread generalization of low preparedness stemming from ITE deficits. This strong self-perception suggests that tandem teaching acts as a potent, job-embedded professional development strategy that compensates for initial weaknesses and elevates self-reported competence over time.
- The Critical Role of Model Structure and Experience: Despite comparable ITE deficits, North Macedonian teachers, who participate in a sustained, long-term partnership with an internal PE teacher for all weekly lessons, reported being significantly better prepared across most pedagogical and organizational domains than their Slovakian counterparts. This disparity highlights that the structure and longevity of the tandem partnership are critical determinants of professional growth, with consistent collaboration yielding superior results compared to short-term, rotational models.
- Shared Systemic Deficit in Inclusive Practice: The only area of consistently low preparedness shared by both cohorts was working with children with diverse learning needs. This consensus identifies a shared systemic weakness in primary teacher education across both national contexts, necessitating targeted ITE enhancement and CPD intervention.

5.1. Practical Implications and Recommendations

Based on the socio-constructivist perspective of learning and the concept of Co-Professionalization, the findings suggest practical steps for educational leaders and policymakers. The success of the North Macedonian model suggests a blueprint for strategic professional development. It is recommended that policymakers formally recognize and support collaborative teaching as a viable, job-embedded CPD strategy that facilitates the transfer of effective pedagogical principles and fosters sustainable changes in practice. The system should mandate long-term partnerships rather than short-term rotations, as the enduring collaboration between the generalist and specialist is necessary for the tandem teaching system to develop and flourish. Furthermore, given the shared systemic deficit, pedagogical faculties and CPD programs must place greater emphasis on inclusive teaching strategies during both pre-service training and ongoing development. This model minimizes the risk of de-skilling (associated with simple outsourcing) by formally maintaining the specialist teacher's role as the primary mechanism for skill enhancement and quality assurance in QPE.

5.2. Study Limitations and Future Research Directions

The present study has several limitations, with the foremost one being that the results are based on self-reported data, which reflects teachers' subjective perceptions and may not fully align with their actual pedagogical competence. The cross-sectional design captures only a single snapshot in time, which is a critical constraint given that time and experience appear to be key factors in achieving competence. Finally, the findings are

limited to the specific educational contexts and tandem teaching models of Slovakia and North Macedonia.

To address these limitations, future research should directly explore the efficacy of these models by conducting a longitudinal study that follows the same teaching partners over several years. Critically, research must also explore the link between teacher-perceived preparedness and objective student outcomes, such as physical activity levels (e.g., MVPA—Moderate-to-Vigorous Physical Activity) and motor skill development. Lastly, to understand the nuances of the collaborative process, qualitative structured interviews with both generalist and specialist partners are needed to uncover the specifics of their pedagogical exchange and the explicit transfer of subject-specific knowledge.

Author Contributions: Conceptualization, G.L. and B.P.; methodology, B.P. and G.L.; validation, B.P., G.L., B.A., T.B. and I.K.; formal analysis, H.R.; investigation, B.P. and T.B.; data curation, T.B. and H.R.; writing—original draft preparation, G.L. and B.P.; writing—review and editing, G.L., B.P., T.B. and I.K.; visualization, G.L.; supervision, B.A.; project administration, B.A.; funding acquisition, B.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research and its associated article processing charge (APC) were funded by the Slovak Scientific Grant Agency (VEGA) under grant number 1/0127/23, titled "*Tandemové vyučovanie telesnej a športovej výchovy na 1. stupni základnej školy a jeho vplyv na motorický, kognitívny a afektívny rozvoj žiakov*" (Tandem teaching of Physical and Sport Education at the first level of primary school and its impact on the motor, cognitive, and affective development of pupils). The study sponsors had no role in the design and conduct of the study, the analysis and interpretation of data, or in the preparation, review, or approval of the manuscript.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Faculty of Physical Education and Sport, Comenius University in Bratislava, Slovakia (protocol code 10/2024, 21 June 2024).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original data presented in the study are openly available in Zenodo at DOI: https://doi.org/10.5281/zenodo.17062979.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Abbreviations

The following abbreviations are used in this manuscript:

CPD	Continuing Professional Development
FMS	Fundamental Movement Skills
ITE	Initial Teacher Education
MVPA	Moderate-to-Vigorous Physical Activity
PE	Physical Education
PL	Physical Literacy
QPE	Quality Physical Education

Appendix A

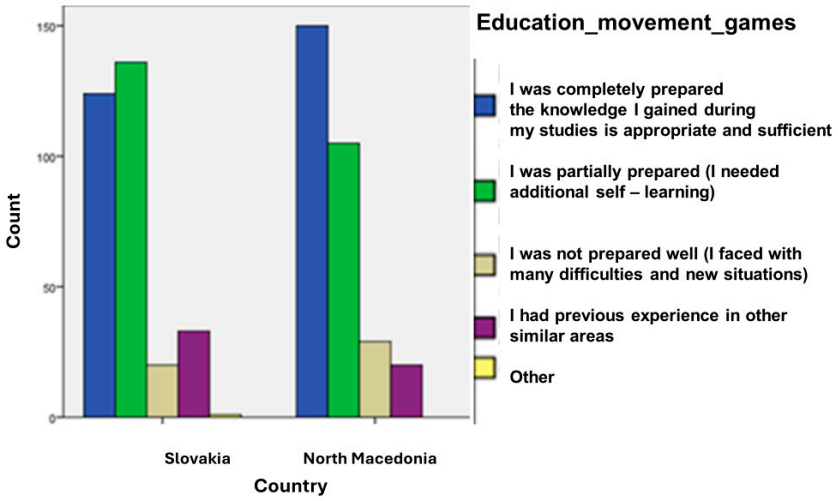

Figure A1. Level of preparedness of tandem teachers for use of movement games at PE classes.

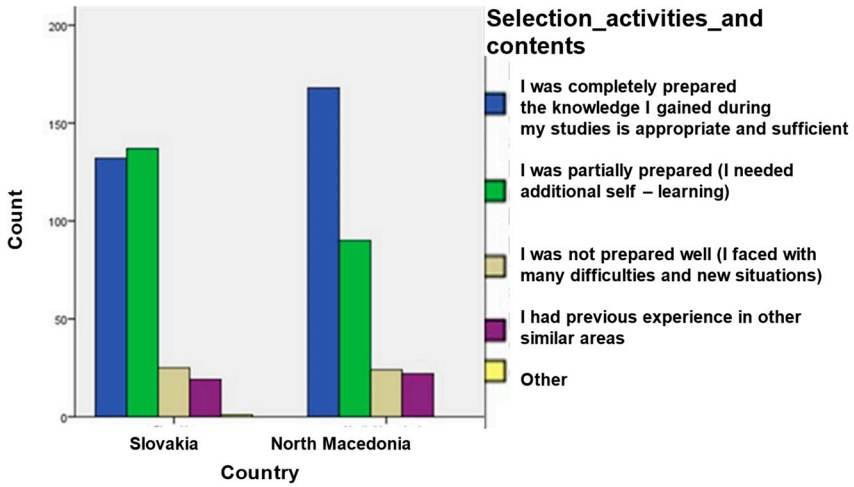

Figure A2. Level of preparedness of tandem teachers for selection of activities and contents appropriate for children's age and abilities.

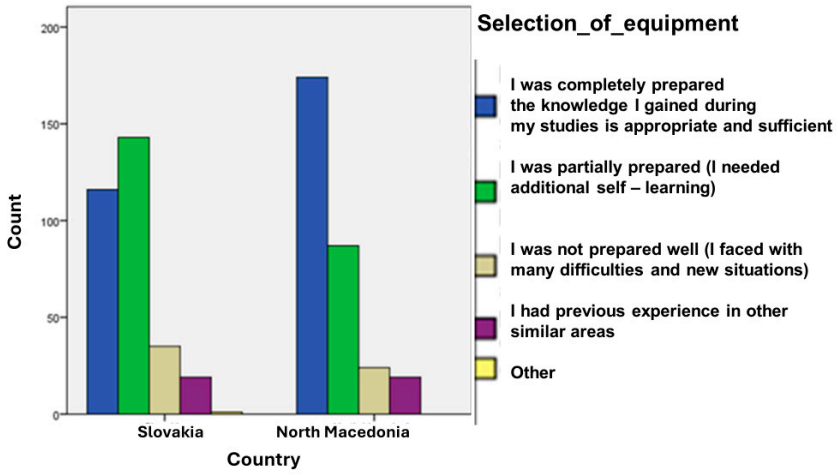

Figure A3. Level of preparedness of tandem teachers for selection of equipment appropriate for children's age and abilities.

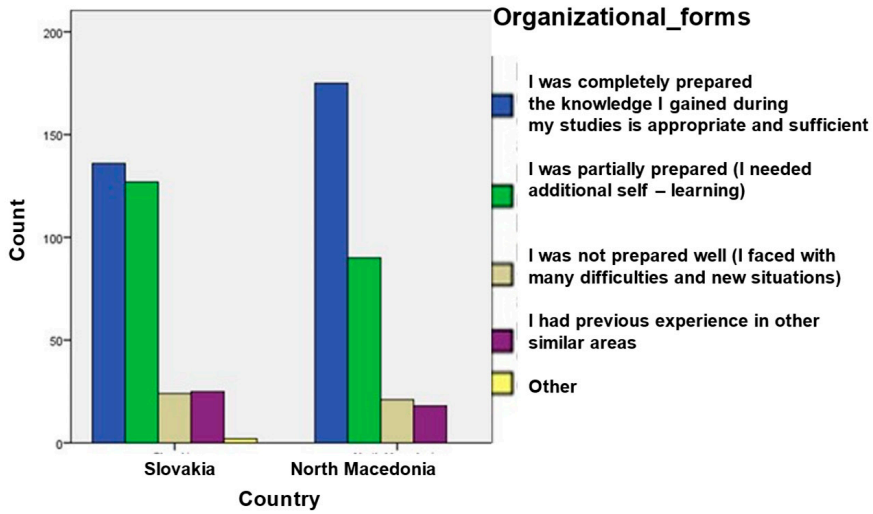

Figure A4. Level of preparedness of tandem teachers for choosing organizational forms according to students' age and abilities.

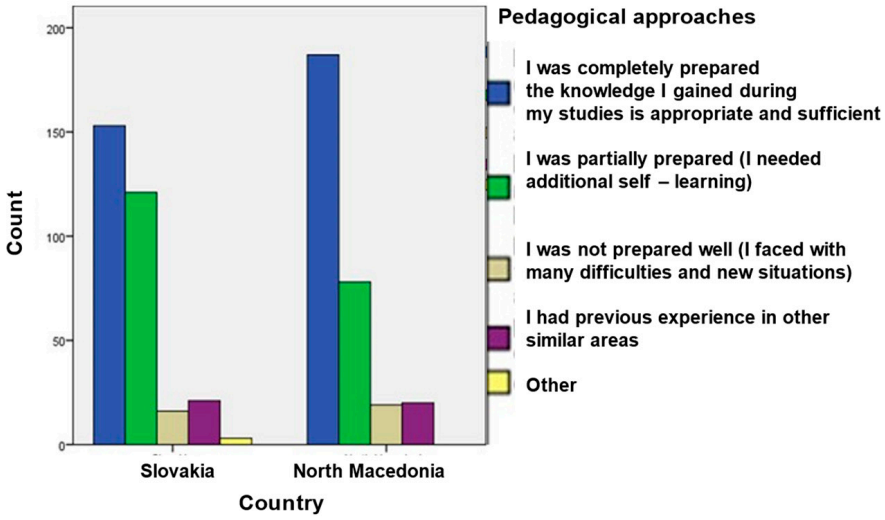

Figure A5. Level of preparedness of tandem teachers for pedagogical approaches appropriate for working with children at younger age.

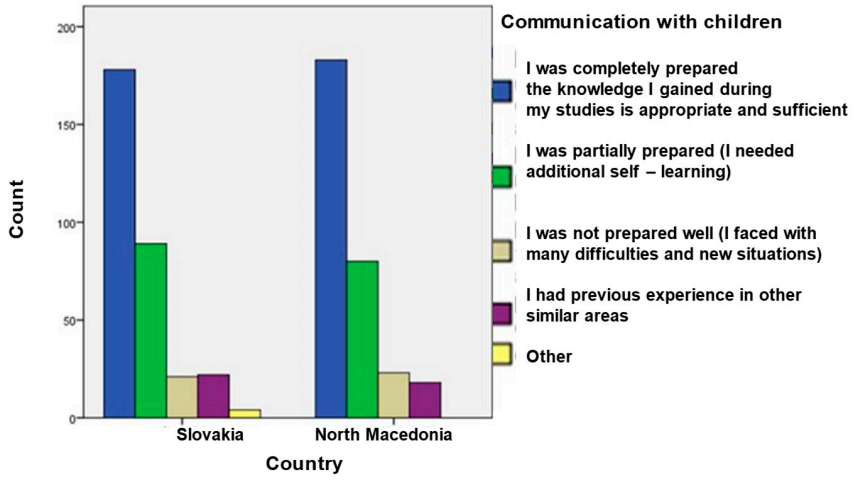

Figure A6. Level of preparedness of tandem teachers for communication with children in early school period.

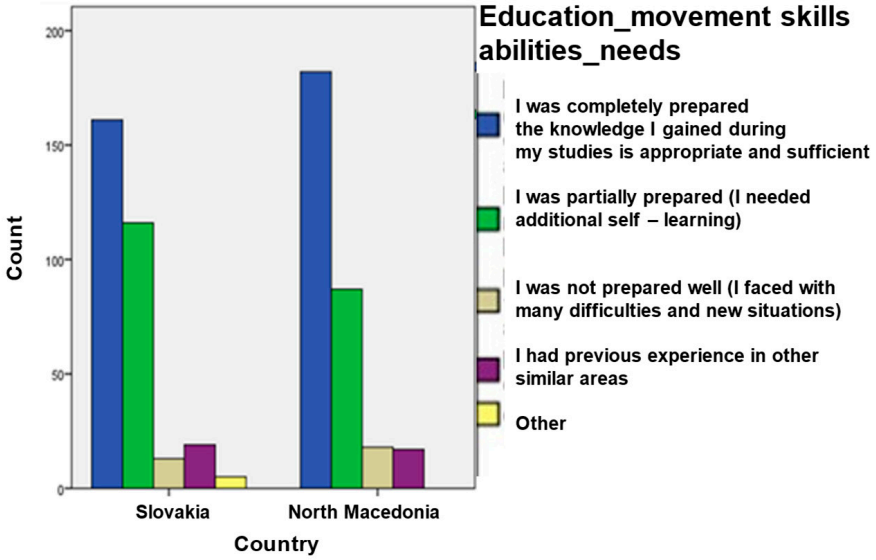

Figure A7. Level of preparedness of tandem teachers for movement skills, abilities and needs of children in early-school period.

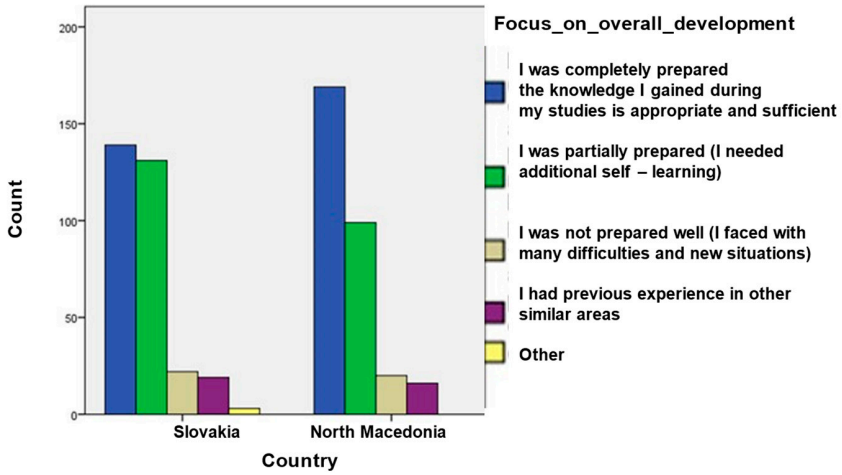

Figure A8. Level of preparedness of tandem teachers for approach focused on overall development and not just on development of movement skills.

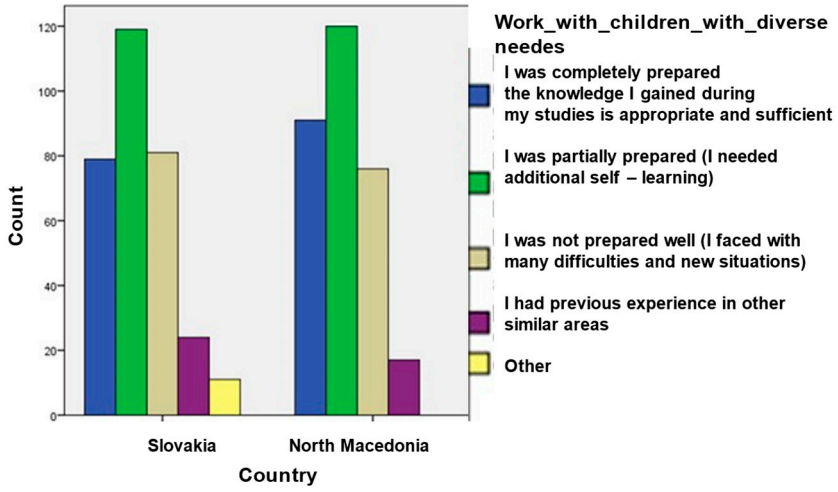

Figure A9. Level of preparedness of tandem teachers for work with children with diverse learning needs.

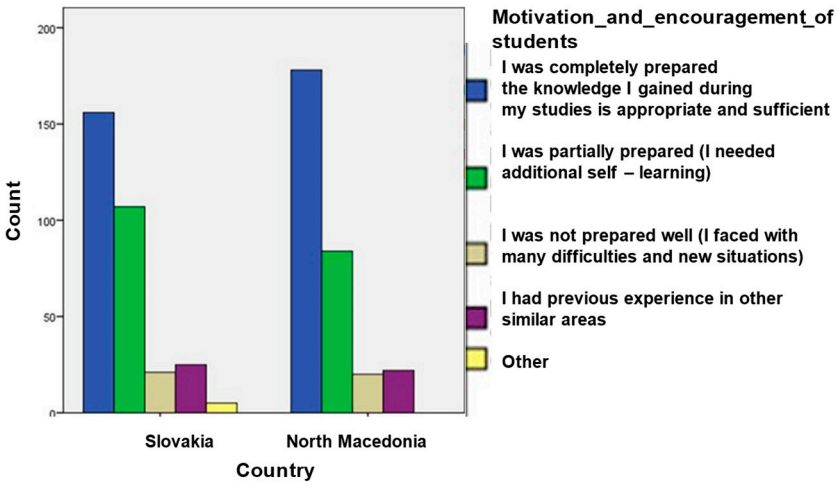

Figure A10. Level of preparedness of tandem teachers for motivation and encouragement of students.

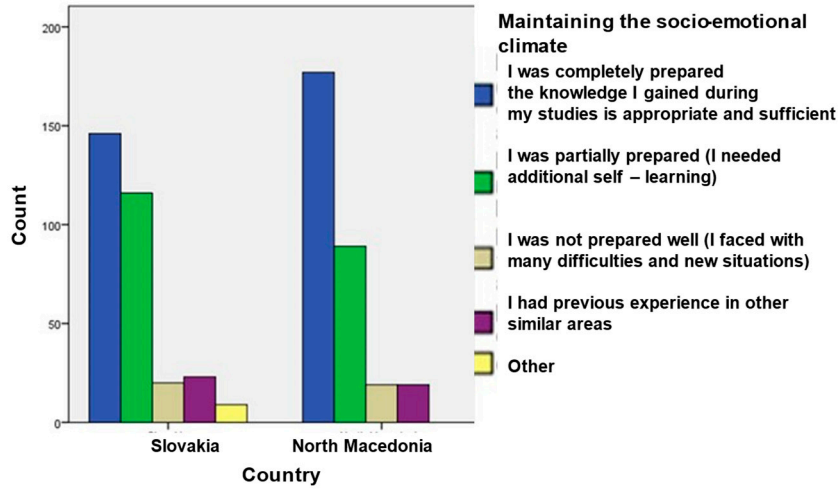

Figure A11. Level of preparedness of tandem teachers for maintaining the socio-emotional climate in the class during PE lessons.

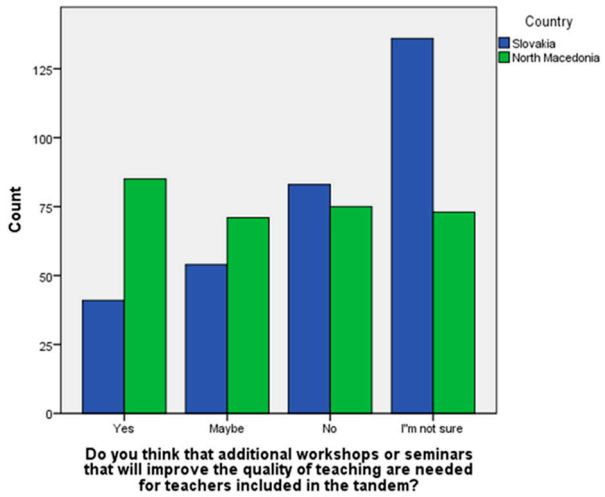

Figure A12. Opinion of teachers from Slovakia and North Macedonia regarding additional workshops and seminars.

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