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Professional competencies, motivation, cognitive abilities and personality in pre-service teachers

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The main aim of the study was twofold: to measure the personality traits, motivation to study, cognitive abilities and professional competencies of pre-service teachers from the Czech Republic and Slovakia and to examine their mutual relationships. A total of 515 pre-service teachers (194 Czechs, 321 Slovaks) aged 17–37 ($M = 20.40$; $SD = 1.74$; 21% men) filled out the Executive Skills Questionnaire-Revised, the Questionnaire on Teacher Interaction – Self-assessment, the Cognitive Reflection Test, the Didactic Competencies Questionnaire, the Scientific Reasoning Scale, the Slovak Teaching Style Questionnaire, the Scale of Motivation for Choosing Teaching Profession and the Big Five Inventory. Significant differences between Slovak and Czech pre-service teachers were identified in their motivation for choosing the teaching profession, cognitive abilities and executive functions and personality traits. Personality traits (agreeableness, negative emotionality and open-mindedness) and motivation for choosing the teaching profession (prosocial behavior, interest) were factors more strongly associated with professional competencies than country.

KEYWORDS

professional competency, personality, motivation, cognitive ability, teacher

1 Introduction

The education systems, teacher training, finance and the teaching profession differ across countries, even within Europe (Everington et al., 2011; Hofstede, 1986). And within Europe, two countries that formed one state for many decades are of interest: the Czech Republic and the Slovak Republic (Czechoslovakia from 1918 to 1992; before that both were a part of Austria-Hungary). Apart from an interruption during the Second World War, the two countries were part of the same state for 74 years. This means that they were subject to a single system of rules for higher education. Since 1993, the Czech Republic and Slovakia have formed their politics and laws independently, including their respective educational systems. This is a unique situation of a natural experiment. Therefore, it is valuable to see whether, after almost three decades in which each state had its own education policy, there are now some differences that logically should be due to circumstances in the management and organization of higher education.

Despite the shared past, it seems that the Czech and Slovak Republics differ in indicators that may be related to the teaching profession, such as power distance, masculinity, and avoidance of uncertainty. According to Hofstede (1986), in education, a large power distance society means the teacher is a guru and initiator demanding respect from students, education is centered on the teacher, students ask to speak and do not contradict or criticize, and teachers

and parents form a coalition. Next, more masculine societies value good students and see them as the norm, they are focused on performance, and failure in school has an impact on self-image, and competition is present, and physical punishments are accepted. Finally, strong avoidance of uncertainty in society prefers structured learning situations, academic language, accuracy in problem-solving and having all the answers; it accepts emotional behavior, but intellectual disagreement is interpreted as personal disloyalty. Slovakia and Czech Republic are relatively different in these dimensions: power distance society is highest in Slovakia and relatively high in Czech in present time, Slovakia is more masculine than the Czech Republic, and strong uncertainty avoidance characterizes Czech society (Cultures and Organizations, *Software of the Mind*, 2010; Hofstede, 1984, 1991; Minkov and Kaasa, 2022). Moreover, there are also differences in the salaries of Czech and Slovak teachers. Slovak teachers earn the least among OECD countries, around USD 9,000 (per year) less than Czech teachers (OECD, 2024).

In addition to the differences mentioned, there are also socio-cultural differences in the factors related to teachers' professional competencies or pedagogical effectiveness (e.g., Gatial et al., 2023; Verešová et al., 2023; OECD, 2005; Watt et al., 2012). We conducted the present study to determine whether we can even think about how to effectively use the proximity of the two countries for mutual inspiration and to facilitate the implementation of work strategies and policies, in other words, to distinguish in which areas teachers from the two countries can be addressed equally in basic training and in which differentiated. We focused on potential differences in the professional competencies of pre-service teachers from these countries and on the relationships of those competencies and individual factors (motivation, personality and cognition) in Czech and Slovak pre-service teachers.

There is a gap in the literature regarding such a comparison. Moreover, identifying these factors in pre-service teachers is important in terms of organizing teaching during study or improving the selection of candidates for study. Currently, a major problem is the attrition of new teachers; therefore, it is advisable to monitor motivation already in pre-service teachers (Nesje et al., 2018). Targeting student motivation in tertiary education has been shown to be an effective way of preparing graduates for future work with greater efficiency (Bredenkamp et al., 2023). With regard to executive functioning, there is ambiguous evidence about its development over the course of study (Corcoran and O'Flaherty, 2017), but this can be addressed through appropriate student selection. Furthermore, work on personality development in pre-service teachers is emerging as an avenue for follow-up work (Chiva-Bartoll et al., 2019). Therefore, it is logical to focus our study on pre-service teachers in order to obtain baseline data also for the Slovak and Czech populations.

1.1 Professional competences

There are many professional competency models that form the basis for the professional standards of teachers (Kasáčová, 2006; Leila and Maryam, 2018; Pennings and Hollenstein, 2020; Rapsová, 2024). Most of these include competencies oriented toward students and educational processes and the self-development of teachers. The development of professional competencies can be linked to satisfying the needs of future teachers. From another point of view, professional competence stands for professional knowledge, professional thinking

and the professional values, abilities and practical skills related to the teaching profession and pedagogical activities (Rapsová, 2019; Süttö et al., 2022). The development of professional competencies satisfies the cognitive and pedagogical needs of the future teacher, while a specific aspect of this development is the development of didactic competence, which is linked to professional didactics and, above all, to practice in schools. Next is the development of social competence for the effective social behavior of future teachers, which increases the quality of social interactions (Han and Kemple, 2006; Merrell and Gimpel, 2014; Rapsová, 2019; Süttö et al., 2022; Verešová et al., 2023). The combination of all needs and their satisfaction leads to the successful self-realization of the teacher in the school environment and the effective use of individually acquired and developed competencies and also continues to develop in the process of further training. In the present study, we focused on didactic competencies (competencies oriented on the educational process) and interaction and teaching styles (competencies oriented toward students).

Didactic competencies (DC) of teachers are characterized by pedagogy, didactic and psychology knowledge, using innovations, designing lessons and evaluating the educational process (Šutáková, 2017). In the present study, we focused on five phases of lesson design: planning and preparation, realization, classroom climate, diagnostics and evaluation, and self-reflection (Rapsová and Süttö, n.d.; Rapsová, 2024). Next, we examined teaching styles (TS) as preferred teaching methods and forms supporting learning (Ford et al., 2016; Grasha, 2002; Mohanna et al., 2007), as well as techniques serving to transfer knowledge to students (Shah et al., 2021). Teaching styles affect the learning of new information and the abilities and learning styles of students (Chetty et al., 2019; Shah et al., 2021). Teaching styles are also associated with personality traits (Grasha, 1994), the self-efficacy of students and students' performance (Chetty et al., 2019). The most frequently used model is Grasha-Reichmann's (Ford et al., 2016; Grasha, 2002), with five basic styles (expert, formal authority, personal model, facilitator and delegate). In present study, we examined four teaching styles: a supportive teaching style, a goal-oriented style, a knowledge-oriented style and a managerial style based on the studies (Ford et al., 2016; Grasha, 2002; Mohanna et al., 2007).

Finally, interaction style (IS) in our study means how a teacher communicates with a student or pupil and how predominant their behavior is (Wubbels et al., 1987; Wubbels and Levy, 1991). The supervisor approach encourages cooperation among students, their initiative and autonomy, without regard to discipline, even if in his research (Tripon, 2021) did not show the influence of the level of teacher support on the development of student grades. On the other hand, Käfer et al. (2019) found that the supportive and helpful approach to dealing with students' errors positively affected their academic performance in English language learning. It seems that individual interaction styles are a complex structure of individual responses that may be an aggregate response to a single stimulus and has its justification for the teacher's practical work in motivating and activating students.

1.2 Individual factors

1.2.1 Teacher personality

The personality of teachers influences student acceptance and academic achievement. While there is no consensus on ideal teacher

personality traits due to self-selection and local conditions (Rusu et al., 2012), teacher personality combined with professional competencies correlates with successful teaching (Dickson and Wiersma, 1984; Gibney and Wiersma, 1986). Regarding the Big Five personality traits, research by Kim et al. (2019) identifies conscientiousness and extraversion as significant predictors of teacher effectiveness. Barrick and Mount (1991) further confirm that extraversion is positively correlated with work performance in professions that require interpersonal interactions. Additionally, extraversion, conscientiousness and teaching enthusiasm predict learning support in relation to the teaching profession and maintaining classroom discipline (Baier et al., 2019). Effective teachers typically demonstrate higher extraversion and open-mindedness with lower neuroticism (Aydın et al., 2013; Costa and McCrae, 1992; Han and Carole Pistole, 2017). Our previous research identified emotional stability, agreeableness, open-mindedness and extraversion as predictors of teachers' professional competencies (Verešová et al., 2023; Mikušková et al., 2024).

1.2.2 Teacher motivation

Teacher personality traits are connected to professional motivation for the teaching profession (Lemrová and Cakirpaloglu, 2017). Research identifies two primary types of motivation for the teaching profession: extrinsic (financial reward job stability) and intrinsic (satisfaction with working with children, professional prestige) motivation. Some authors extended motives by altruistic motivation (Yong and Seng, 1995) or not having a choice (Tomšík and Verešová, 2016; Verešová et al., 2023). Rots et al. (2010) found that motivation explains over half of the variance in the willingness to become a teacher. Motivation thus emerges as a key factor – according to the authors, intrinsically motivated pregraduated teachers and those who have a sustained motivation to teach are more likely to remain in the teaching profession and fulfil its requirements effectively. According to Sinclair (2008), the most common reasons for choosing the teaching profession are a positive self-assessment, personal qualities and skills as a teacher, the motivation to work with children and the intellectual stimulation that the teaching profession offers. Part of these motives are a form of intrinsic motivation (positive self-assessment, personal qualities, the ability to be a teacher, intellectual stimulation); another part (the motivation to work with children) can be described as altruistic motivations. And both intrinsic and altruistic motivations seem to be significant antecedents of teacher professional competencies (Verešová et al., 2023). Research also reveals national differences in teaching motivation (Sardana et al., 2021), with no conclusive answer about which motivation type predominates due to geographic, cultural and historical differences.

1.2.3 Cognitive abilities

Teachers employ several cognitive functions in their profession. A frequently studied cognitive ability is cognitive reflection—the ability to use more rational thinking rather than intuitive thinking—and it correlates with disposition toward the need for cognition, education levels, and the teaching of technology-oriented teaching (Frederick, 2005; Janssen et al., 2019). Teachers with PhD degrees had the highest cognitive reflection; teachers without a PhD had a lower performance, and the lowest scores were found in teachers outside of academia. However, the predictive value of the CRT for teaching performance is considered low and not sufficiently indicative. The role of cognitive

reflection seems to be not only the suppression of impulsivity in reasoning but, in general, a way of reasoning tied to the profession.

Scientific reasoning—using scientific procedures and principles in problem-solving—represents another important teaching ability (Drummond and Fischhoff, 2017b; Krell et al., 2020; Morris et al., 2012; Zimmerman, 2007). Hilfert-Rüppell et al. (2021) found effective teaching requires not only in knowing how (epistemic knowledge) but also in knowing why (scientific procedures and principles). For example, a study on the effectiveness of math teaching showed a significant relationship between the cognitive skills of the math's teacher (perception, interpretation, decision-making) and classroom management skills and student learning progress (Blömeke et al., 2022). Capps and Crawford (2013) and Shulman (1986) agree that scientific thinking is irreplaceable in the education system and should therefore be included in the professional competences of teachers, as epistemic knowledge is part of the teacher's knowledge content. Research on teachers' scientific thinking shows that pre-service teachers who believe in objective reality and value critical thinking show greater improvements and practical application (Taylor et al., 2012).

1.2.4 Executive functions

Executive functions—processes supporting and controlling information processing and influencing performance—underlie many cognitive abilities (Burgess, 2010; Morgan-Borkowsky, 2012; Strait et al., 2020). Although there is a lack of research on the role of executive functions in teaching, in a previous study (Gatíal et al., 2023), we found a well-developed plan and time management (as executive functions) as predictors of teachers' professional competencies. In addition, Gatíal et al. (2023) found a correlation between executive functions (planning, time management and organization) and the didactic competences of teachers (planning and preparation of lessons, realization of lessons, classroom climate and discipline, diagnosis and assessment).

1.3 Current study

The main aim was to investigate possible differences between pre-service teachers from countries with a common past in terms of the composition of professional competencies, motivation and cognition. The study was conducted with a large number of variables because it would be impossible to describe such a complex situation with only one or two variables. First, we compare Czech and Slovak pre-service teachers in terms of personality, motivation for the teaching profession, cognitive abilities and professional competencies. We asked several research questions: to what extent do Slovak and Czech pre-service teachers differ in the composition of professional competencies? Which personality types of people apply to study teaching in the two countries? Which motives for choosing the teaching profession prevail in the two countries, and are there differences in the level of cognitive abilities between Czech and Slovak pre-service teachers?

Second, we looked for relationships between professional competencies and other factors (personality traits, motivation to study and cognitive abilities). We tried to find answers to the questions of how professional competencies are related to personality structure and cognitive abilities and which motives for choosing a teaching

profession are related to better developed professional competencies. Higher education and its application operate as a chain of events with a huge time inertia. The consequences of potential similarities and differences, as well as relationships, will become apparent in at least two decades when the children taught by the teachers we are now training go on to higher education. This is why we focused on pre-service teachers, as this is the most influential part of the educational system.

At the same time, it is acknowledged that certain latent or structural differences between the two countries analyzed cannot be entirely mitigated and may significantly impact the findings. For example, in the Czech Republic, despite the legal codification of the teaching profession and the establishment of well-defined qualification standards, a parallel process of deprofessionalization can be observed in practice (Spilková, 2023) attributes this to superficial reforms that have not met the expected standards and have thus undermined the core professional values and public perception of the teaching profession. In addition, the employment of individuals without formal pedagogical training — often necessitated by a lack of qualified candidates—has become a widespread practice. This trend has implications for the overall quality of educational processes and influences the profile of individuals who choose a career in teaching (Dofková and Fačevicová, 2017).

Contrary to Slovakia, another challenge in the Czech Republic is that there is no uniform consensus on the competencies that teachers should have and the way in which these competencies are taught. Another notable finding concerns the changes in students' attitudes during their teacher training. Research by Koželuh et al. (2024) shows that the willingness of Czech students to enter the teaching profession during their studies decreases as they progress. This decline could reflect their self-assessment of their competencies, their perception of the profession's realities, and a growing awareness of the demands associated with teacher training. In contrast, a study by Hlavatá and Simon (2024) in Slovakia showed that the inclusion of additional elements such as teaching selected subjects in a foreign language increased students' motivation and interest in working with students from different international educational backgrounds. At the same time, these students improved their competencies in the areas of communication, collaboration and critical thinking. These findings suggest that the differences in outcomes between Czech and Slovak pre-service teachers may not be only due to selection criteria, but could also be influenced by differences in curricula, conceptualization of practicum experiences, academic workload and institutional approaches to fostering professional competencies.

2 Methods

2.1 Participants and design

Data were collected during October and December 2021 at universities in Ostrava (Czech Republic) and Nitra (Slovakia). Only students of the teacher training programs participated in the study. Participants filled out a battery of instruments in paper-pen form. A total of 845 pre-service teachers (232 from the Czech Republic and 613 from Slovakia) participated in the data collection, and only those teaching lower and upper secondary grades domain were included in the analyses.

The final sample consisted of 515 pre-service teachers 194 Czechs, 321 Slovaks (the unequal sample size resulted from the willingness of the students and the number of available students) aged 17–37 ($M = 20.40$; $SD = 1.74$), 21% men. *Post hoc* sensitivity analysis conducted in G*Power 3.1.9 (Faul et al., 2007) showed the current sample size provided sufficient power (0.80) to detect effect sizes of $d > 0.26$ in t-tests and correlations of $r > 0.086$ (for the total sample; for the Slovak sample $r > 0.109$, for the Czech sample $r > 0.141$) with 5% error probability.

Participants were entered into a draw for vouchers to a bookstore (worth 30, 20 and 15 €) and sets of books (produced by the department). The study was carried out with ethical principles introduced by the American Psychological Association. Data were anonymized and shared through the OSF.¹

After signing the informed consent, participants filled out the instruments in the following order: demographics, Executive Skills Questionnaire-Revised, Questionnaire on Teacher Interaction – Self-assessment, Cognitive Reflection Test, Didactic Competencies Questionnaire, Scientific Reasoning Scale, Slovak Teaching Style Questionnaire, Scale of Motivation for Choosing Teaching Profession and Big Five Inventory.

2.2 Instruments

All instruments used were administered in the respective national language - Slovakian students completed the instruments in Slovak, while the instruments for Czech students were translated into Czech.

2.2.1 Professional competencies

Interaction styles, teaching styles and didactic competencies were measured as professional competencies. Although the sample were students, they already had experience in teaching practice and developed their professional competences during their training.

Teachers' interaction styles were measured using the Slovak version of Questionnaire on Teacher Interaction – Self-assessment (QTI-S) (Verešová, 2021; Mikušková, 2022). Participants had to evaluate on a 5-point scale (1 = never; 5 = always) their behavior (concerning their pedagogical activity) in terms of interaction style. A total of 40 items allow the monitoring of eight sectors of behavior (5 items for each sector) relying on the teacher interaction model (Leary, 1957; Wubbels et al., 1987): leadership, helpful, understanding, student-teacher responsibility, uncertain, dissatisfied, objecting and strictness. The mean scores for each sector were computed, and a higher score indicates a higher preference for the interaction style.

Teaching styles were measured using the Slovak Teaching Style Questionnaire (STSQ) (Mikušková, 2022; Verešová, 2021). Using factor analysis of the items the Teaching Style Inventory (Ford et al., 2016; Grasha, 2002) and The Staffordshire Evaluation of Teaching Styles (Mohanna et al., 2007) four strong teaching styles were identified (each with four items): supporting, goals-oriented, knowledge-oriented and manager. Participants rated all 16 items on a 5-point scale (1 = strongly disagree; 5 = strongly agree). The mean

¹ <https://osf.io/7m96z>

scores were computed, with a higher score indicating a higher preference for the teaching style.

Didactic competencies were measured using the Didactic Competencies Questionnaire (DCQ) (Mikušková, 2022; Rapsová et al., 2021) as behavior in five phases of lesson realization: planning and preparation, realization, classroom climate, diagnostics and evaluation, and self-reflection. Participants assessed 57 behaviors and statements on a 5-point scale (1 = strongly disagree; 5 = strongly agree). Mean scores were computed for each phase of the lesson (a higher score indicated better-developed competency).

2.2.2 Individual factors

Personality traits, motivation for choosing teaching profession and cognitive abilities (cognitive reflection, scientific reasoning, and executive functions) were measured as individual factors.

A short 30-item form of the Big Five Inventory (BFI-2-S) (Kohut et al., 2020) was used to measure personality traits. The participants had to assess 30 statements (six items for each trait) on a 5-point scale (1 = strongly disagree; 5 = strongly agree) in order to measure their extraversion, agreeableness, conscientiousness, negative emotionality and open-mindedness. The mean scores for all five domains were computed and a higher score indicated a stronger particular personality trait.

Students' motives for career choices were assessed using the Scale of Motivation for Choosing Teaching Profession (SMVUP-4-S) (Tomšík, 2019; Tomšík and Verešová, 2016). Participants rated 48 statements on a 5-point scale (1 = strongly disagree; 5 = strongly agree). The mean scores for twelve types of motives were computed. Motives were grouped into three categories: intrinsic motivation (interest, self-perception of teaching skills, work potential and previous experience), extrinsic motivation (benefits, income, social status and significant others), altruistic motivation (prosocial behavior, work with children and work with youth) and alternative choice. A higher score indicates a higher level of motivation factor.

The Cognitive reflection test (CRT) (Frederick, 2005; Toplak et al., 2011) was used to measure cognitive reflection. We used a six-items version in which participants had to solve numerical and verbal tasks. Finding the correct solution requires participants to suspend their first intuitive reaction and engage in rational thinking. Participants received one point for each correct solution; the sum score was computed and a higher score indicated a higher cognitive reflection.

The Scientific reasoning scale (SRS) (Bašnáková et al., 2021; Drummond and Fischhoff, 2017a) was used to measure scientific reasoning – the ability to evaluate evidence. In six scenarios, participants had to select whether they agreed or disagreed with the conclusion. Again, the sum score of correct answers was computed, so a higher score indicated a higher level of scientific reasoning.

The Executive Skills Questionnaire-Revised (ESQ-R; Strait et al., 2020) was used to measure executive functions as skills (not abilities). Participants evaluated the frequency of 25 behaviors on a scale from 1 (never, rarely) to 5 (always, very often). The ESQ-R measures five areas of executive functions: plan management, time management, organization, emotional regulation, and behavioral regulation. The mean for each area of executive functions was calculated; higher scores indicate problems with that area.

2.3 Data analyses

Descriptive statistics (mean, standard deviation, skewness, and kurtosis) for all measured variables, internal consistency (measured by Cronbach's alpha and for the Cognitive reflection test and the Scientific reasoning scale by the Kuder–Richardson formula 21) were calculated. To determine whether there are differences between Czech and Slovak pre-service teachers, independent samples t-tests were conducted. Correlation and regression analyses were then calculated to investigate how professional competencies are related to personality, motivation and cognitive abilities with IBM SPSS Statistics 29. Regression analyses were performed with The jamovi project (2024).

3 Results

3.1 Descriptive statistics and comparative analysis

Descriptive statistics and the internal consistency of professional competencies for the Czech and Slovak samples are reported in Table 1, and descriptive statistics and the internal consistency of personality traits, motivation and cognitive abilities are in Table 2.

The Shapiro–Wilk test showed that the variables were not normally distributed for both groups (except diagnostics and evaluation). There was no homogeneity of variance for five variables, as determined by Levene's test for equality of variance (labelled * in Tables 1, 2). We conducted research on sufficiently large samples, analyzed aggregate values (no nominal or ordinal values) and all variables had skewness and kurtosis values up to 1 (four variables had skewness values up to 2, 3 variables had kurtosis values up to 2, and there were a few exceptions: helpful and understanding interaction styles, realization and self-reflection as didactic competencies and teaching profession as alternative choice as motive had kurtosis values of 2.656–7.001). So, to answer the question to what extent do Slovak and Czech pre-service teachers differ in the composition of professional competencies, personality traits, motives for choosing a teaching profession and level of cognitive abilities, an independent t-test with a 95% confidence interval for the difference in means was conducted.

Slovak and Czech pre-service teachers differed in all professional competencies (except understanding, student-teacher responsibility and uncertain interaction styles and didactic competency self-reflection). Slovak pre-service teachers assessed their own competencies as better than Czech pre-service teachers did (Table 1).

Table 2 shows that Slovak pre-service teachers indicated a higher intrinsic interest in the profession and stronger motivation to work with youth; Czech pre-service teachers were motivated by their previous experiences, benefits and income in the teaching profession and by significant others. There were significant differences in personality traits between pre-service teachers from Slovakia and the Czech Republic. Slovaks had higher traits of agreeableness and conscientiousness, and Czechs had higher neuroticism. On the other hand, Czech pre-service teachers were better in cognitive abilities (cognitive reflection, scientific reasoning) and executive functions (plan and time management, and organization).

TABLE 1 Descriptive statistics of professional competencies for the Czech and Slovak samples (comparison).

Variables	Czech students			Slovak students			t-test					
	<i>M</i>	<i>SD</i>	α	<i>M</i>	<i>SD</i>	α	<i>t</i>	95% CI - MD				
							(<i>df</i>)	<i>p</i>	<i>MD</i>	<i>Lower</i>	<i>Upper</i>	<i>d</i>
Age	20.63	1.26		20.26	1.97	–	–2.379 (513)	0.018	–0.375	–0.685	–0.065	0.025
Teaching styles												
Supporting	2.95	0.64	0.479	3.14	0.58	0.481	3.513 (509)	<0.001	0.193	0.085	0.301	0.267
Goals-oriented	2.88	0.66	0.683	3.25	0.69	0.680	5.926 (509)	<0.001	0.368	0.246	0.490	0.461
Knowledge-oriented	3.60	0.62	0.742	3.92	0.66	0.685	5.422 (508)	<0.001	0.320	0.204	0.436	0.425
Manager	4.05	0.58	0.724	4.22	0.58	0.721	3.321 (507)	<0.001	0.177	0.072	0.282	0.329
Interaction styles												
Leadership	4.04	0.53	0.662	4.21	0.46	0.764	4.017 (513)	<0.001	0.178	0.091	0.265	0.326
Helpful	4.36	0.53	0.664	4.49	0.43	0.813	3.009 (513)	0.003	0.128	0.044	0.212	0.338
Understanding	4.27	0.49	0.601	4.33	0.42	0.611	1.584 (513)	0.114	0.065	–0.016	0.145	0.217
Student-teacher responsibility	3.91	0.48	0.550	3.95	0.51	0.507	0.873 (513)	0.383	0.040	–0.050	0.129	0.067
Uncertain*	2.34	0.79	0.653	2.21	0.66	0.724	–1.956 (355.442)	0.051	–0.132	–0.265	0.001	0.150
Dissatisfied	2.03	0.61	0.643	1.88	0.57	0.714	–2.942 (513)	0.003	–0.157	–0.262	–0.052	0.367
Objecting	2.02	0.62	0.654	1.87	0.55	0.678	–2.950 (513)	0.003	–0.155	–0.259	–0.052	0.279
Strict	3.16	0.58	0.615	2.98	0.60	0.700	–3.287 (513)	0.001	–0.177	–0.283	–0.071	0.296
Didactic competences												
Planning and preparation*	3.80	0.44	0.832	3.92	0.50	0.791	2.725 (440.916)	0.007	0.114	0.032	0.197	0.366
Realization*	3.83	0.40	0.806	3.92	0.52	0.810	2.283 (479.914)	0.023	0.093	0.013	0.174	0.221
Climate	4.08	0.47	0.755	4.20	0.49	0.769	2.798 (510)	0.005	0.123	0.037	0.210	0.263
Diagnostics and evaluation	3.68	0.41	0.797	3.85	0.47	0.779	4.292 (510)	<0.001	0.175	0.095	0.255	0.414
Self-reflection	3.93	0.85	0.771	3.83	0.83	0.608	–1.266 (510)	0.206	–0.097	–0.247	0.053	0.092

*Equal variances not assumed, *M*, mean; *SD*, standard deviation; α , internal consistency, measured as Cronbach's alpha, *t*, *t*-test value; *df*, degrees of freedom; *p*, significance; *MD*, mean difference, 95% CI – *MD*, 95% Confidence Interval of the Difference; *d*, Cohen's *d*.

3.2 Relationships between professional competencies and country of study, personality, cognitive ability and motivation

Based on correlation analysis (Appendix), we conducted a hierarchical regression analysis to examine how the country of study (step 1), personality, cognitive ability and motivation (step 2) affected professional competencies (for all models, VIF = 1.19–2.54).

Table 3 shows the results for interaction styles as dependent variables. Even after including all variables in step 2, being a Slovak student predicted leadership IS, along with the personality trait

agreeableness, problems with emotional and behavioral regulations and good organization as executive functions, prosocial behavior and self-perception of teaching skills (as motivations for teaching profession); the overall model: $R^2 = 0.40$, $\Delta R^2 = 0.37$, $F(24,453) = 11.75$, $p < 0.001$. The helpful IS was predicted by the trait agreeableness, problems with emotional regulation, self-perception of teaching skills (the strongest predictor) and prosocial behavior (being a Slovak student was a significant predictor only in step 1); the overall model: $R^2 = 0.25$, $\Delta R^2 = 0.24$, $F(24,453) = 6.04$, $p < 0.001$. The understanding IS was predicted negatively by extraversion, positively by agreeableness, problems with time management and behavioral regulation, and prosocial behavior as motivation; the overall model:

TABLE 2 Descriptive statistics of personality traits, motivation and cognitive abilities for the Czech and Slovak samples (comparison).

Variables	Czech students			Slovak students			t-test					
	M	SD	α	M	SD	α	t	95% CI - MD				
							(df)	p	MD	Lower	Upper	d
Motivation												
Interest	2.79	1.23	0.895	3.16	1.28	0.863	3.169 (507)	0.002	0.368	0.140	0.596	0.526
Self-perception of teaching skills	3.67	0.85	0.875	3.78	0.75	0.906	1.501 (507)	0.134	0.109	−0.034	0.252	0.229
Work potential	3.83	0.83	0.852	3.94	0.80	0.878	1.497 (507)	0.135	0.112	−0.035	0.259	0.067
Previous experiences	2.89	1.42	0.828	2.57	1.32	0.861	−2.527 (506)	0.012	−0.316	−0.562	−0.070	0.063
Social status	2.89	0.86	0.839	2.97	0.92	0.855	1.033 (507)	0.302	0.085	−0.077	0.247	0.009
Benefits	3.19	0.82	0.725	3.00	0.78	0.787	−2.623 (507)	0.009	−0.191	−0.335	−0.048	0.293
Income	3.32	0.85	0.855	2.83	0.88	0.885	−6.190 (507)	<0.001	−0.494	−0.650	−0.337	0.706
Significant others	2.67	1.17	0.830	2.46	1.13	0.855	−1.984 (507)	0.048	−0.209	−0.416	−0.002	0.266
Work with youth	3.43	0.99	0.912	3.64	0.95	0.928	2.346 (507)	0.019	0.207	0.034	0.381	0.083
Work with children	3.71	1.12	0.815	3.68	1.13	0.962	−0.327 (507)	0.744	−0.034	−0.237	0.169	0.291
Prosocial behavior	3.73	0.66	0.718	3.78	0.74	0.715	0.705 (507)	0.481	0.046	−0.082	0.174	0.035
Alternative choice	1.86	1.05	0.712	1.82	0.88	0.566	−0.484 (507)	0.629	−0.042	−0.213	0.129	0.191
Personality												
Extraversion	3.43	0.71	0.695	3.49	0.68	0.770	0.986 (502)	0.325	0.063	−0.062	0.188	0.103
Agreeableness	3.92	0.55	0.685	4.07	0.57	0.661	2.850 (502)	0.005	0.148	0.046	0.250	0.344
Conscientiousness	3.66	0.62	0.733	3.81	0.65	0.686	2.470 (502)	0.014	0.146	0.0300	0.262	0.366
Neuroticism*	2.68	0.78	0.707	2.47	0.69	0.811	−2.982 (340.141)	0.003	−0.207	−0.344	−0.071	0.276
Openness to experience	3.71	0.70	0.640	3.81	0.66	0.667	1.587 (502)	0.113	0.099	−0.024	0.222	0.082
Cognitive abilities												
Cognitive reflection*	2.64	2.02	.697 ^a	1.86	1.82	.686 ^a	−4.384 (381.763)	<0.001	−0.786	−1.138	−0.433	0.573
Scientific reasoning	4.88	1.06	0.227 ^a	3.72	1.02	.430 ^a	−12.346 (511)	<0.001	−1.160	−1.349	−0.979	1.127
Executive functions												
Plan management	2.50	0.59	0.785	2.35	0.60	0.781	−2.761 (513)	0.006	−0.149	−0.256	−0.043	0.234
Time management	2.96	0.69	0.492	2.65	0.69	0.480	−4.928 (513)	<0.001	−0.309	−0.432	−0.186	0.431
Organization	2.47	1.02	0.728	2.20	1.01	0.710	−2.946 (513)	0.003	−0.271	−0.452	−0.090	0.257
Emotional regulation	2.79	0.77	0.522	2.72	0.76	0.634	−1.035 (513)	0.301	−0.072	−0.209	0.065	0.047
Behavioral regulation	3.07	0.55	0.306	3.08	0.61	0.332	0.301 (513)	0.763	0.016	−0.089	0.121	0.084

*Equal variances not assumed; M, mean; SD, standard deviation; α , internal consistency (for cognitive reflection and scientific reasoning measured by Kuder–Richardson formula 21), measured as Cronbach's alpha, t, t-test value, df, degrees of freedom; p, significance; MD, mean difference; 95% CI – MD, 95% Confidence Interval of the Difference; d, Cohen's d.

TABLE 3 Hierarchical regression with interaction styles as dependent variables (standardized scores).

Step	IV	L		H		US		STR		UC		D		O		S	
		β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI
1	State	0.09*	[0.00; 0.18]	0.06	[−0.04; 0.16]	0.05	[−0.04; 0.16]	0.09	[−0.02; 0.19]	−0.01	[−0.09; 0.07]	−0.03	[−0.12; 0.07]	−0.03	[−0.11; 0.06]	−0.18***	[−0.25; −0.04]
2	Extraversion	0.04	[−0.04; 0.16]	−0.01	[−0.12; 0.10]	−0.08*	[−0.23; −0.01]	−0.11*	[−0.27; −0.03]	−0.32***	[−0.40; −0.22]	−0.09	[−0.20; 0.00]	0.03	[−0.06; 0.12]	0.08	[−0.02; 0.22]
	Agreeableness	0.13***	[0.07; 0.24]	0.19***	[0.14; 0.33]	0.21***	[0.18; 0.37]	0.03	[−0.07; 0.14]	0.09	[−0.01; 0.15]	−0.21***	[−0.29; −0.11]	−0.25***	[−0.32; −0.16]	−0.13*	[−0.23; −0.02]
	Conscientiousness	0.08	[−0.01; 0.22]	0.02	[−0.09; 0.16]	−0.04	[−0.18; 0.07]	−0.03	[−0.17; 0.10]	−0.03	[−0.13; 0.08]	−0.08	[−0.21; 0.03]	−0.02	[−0.13; 0.09]	0.11	[−0.02; 0.25]
	Negative emotionality	−0.05	[−0.19; 0.04]	−0.04	[−0.18; 0.07]	−0.06	[−0.23; 0.02]	−0.10*	[−0.29; −0.02]	0.22***	[0.13; 0.33]	0.14**	[0.06; 0.29]	0.22***	[0.16; 0.38]	0.00	[−0.13; 0.14]
	Open-mindedness	0.01	[−0.08; 0.10]	0.00	[−0.09; 0.10]	0.05	[−0.02; 0.18]	0.09*	[0.02; 0.23]	−0.04	[−0.12; 0.04]	−0.04	[−0.14; 0.04]	−0.07	[−0.16; 0.00]	−0.02	[−0.13; 0.08]
	Cognitive reflection	0.00	[−0.07; 0.08]	−0.00	[−0.10; 0.07]	0.00	[−0.07; 0.10]	0.02	[−0.03; 0.15]	0.01	[−0.05; 0.09]	0.02	[−0.03; 0.13]	0.02	[−0.02; 0.12]	0.01	[−0.05; 0.14]
	Scientific reasoning	0.01	[−0.07; 0.10]	−0.02	[−0.14; 0.05]	0.03	[−0.01; 0.18]	0.04	[−0.01; 0.19]	−0.01	[−0.10; 0.06]	−0.03	[−0.14; 0.03]	0.01	[−0.06; 0.11]	−0.01	[−0.13; 0.08]
	Planning	−0.08	[−0.21; 0.01]	−0.05	[−0.18; 0.07]	−0.08	[−0.23; 0.02]	0.08	[−0.04; 0.23]	0.13*	[0.01; 0.21]	0.13*	[0.02; 0.25]	−0.02	[−0.13; 0.08]	−0.09	[−0.23; 0.04]
	Time management	−0.02	[−0.12; 0.06]	0.01	[−0.09; 0.12]	0.09**	[0.04; 0.25]	0.02	[−0.07; 0.14]	0.10*	[0.01; 0.18]	0.05	[−0.04; 0.15]	0.04	[−0.04; 0.14]	0.09	[−0.01; 0.22]
	Organization	−0.04*	[−0.18; −0.00]	−0.03	[−0.17; 0.03]	−0.03	[−0.16; 0.03]	−0.02	[−0.15; 0.06]	−0.01	[−0.10; 0.06]	−0.01	[−0.11; 0.08]	0.04	[−0.01; 0.16]	−0.01	[−0.13; 0.09]
	Emotional regulation	0.06*	[0.01; 0.20]	0.07*	[0.01; 0.22]	0.00	[−0.10; 0.11]	0.03	[−0.07; 0.16]	0.20***	[0.13; 0.30]	0.04	[−0.04; 0.15]	0.15***	[0.11; 0.28]	0.09	[−0.00; 0.23]
	Behavioral regulation	0.08*	[0.01; 0.17]	0.07	[−0.00; 0.17]	0.11***	[0.06; 0.23]	0.08*	[0.00; 0.19]	0.05	[−0.03; 0.11]	0.00	[−0.08; 0.09]	0.15***	[0.07; 0.22]	0.06	[−0.04; 0.15]
	Interest	−0.02	[−0.16; 0.03]	−0.03	[−0.20; 0.01]	−0.01	[−0.13; 0.08]	−0.02	[−0.15; 0.07]	0.04	[−0.02; 0.15]	0.01	[−0.08; 0.11]	0.00	[−0.08; 0.10]	0.05	[−0.02; 0.21]
	Self-perception of teaching skills	0.18***	[0.18; 0.40]	0.13***	[0.11; 0.35]	0.03	[−0.07; 0.17]	0.03	[−0.08; 0.18]	−0.16***	[−0.28; −0.08]	−0.03	[−0.15; 0.07]	−0.02	[−0.13; 0.08]	0.09	[−0.01; 0.24]
	Work potential	0.03	[−0.06; 0.14]	−0.00	[−0.11; 0.10]	0.01	[−0.09; 0.12]	0.09*	[0.03; 0.26]	0.08	[−0.00; 0.18]	0.06	[−0.01; 0.19]	0.03	[−0.06; 0.13]	−0.05	[−0.18; 0.05]

(Continued)

TABLE 3 (Continued)

Step	IV	L		H		US		STR		UC		D		O		S	
		β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI
	Previous experiences	0.00	[−0.07; 0.09]	0.02	[−0.03; 0.15]	0.01	[−0.05; 0.13]	0.01	[−0.07; 0.12]	0.01	[−0.06; 0.09]	0.01	[−0.07; 0.10]	0.01	[−0.06; 0.09]	−0.01	[−0.13; 0.07]
	Social status	0.02	[−0.05; 0.12]	0.00	[−0.09; 0.10]	0.00	[−0.09; 0.10]	−0.05	[−0.19; 0.01]	0.03	[−0.04; 0.12]	−0.03	[−0.14; 0.04]	0.04	[−0.02; 0.15]	−0.05	[−0.18; 0.03]
	Benefits	−0.00	[−0.08; 0.08]	−0.01	[−0.11; 0.07]	−0.01	[−0.10; 0.07]	−0.02	[−0.13; 0.05]	0.03	[−0.03; 0.11]	0.01	[−0.06; 0.10]	0.07*	[0.02; 0.17]	−0.00	[−0.10; 0.09]
	Income	−0.02	[−0.13; 0.05]	−0.00	[−0.10; 0.10]	−0.01	[−0.12; 0.08]	0.01	[−0.09; 0.12]	−0.03	[−0.12; 0.04]	0.02	[−0.06; 0.13]	−0.05	[−0.17; 0.00]	0.01	[−0.09; 0.13]
	Significant others	0.02	[−0.02; 0.13]	0.00	[−0.09; 0.09]	0.01	[−0.06; 0.11]	0.05*	[0.02; 0.20]	−0.01	[−0.08; 0.06]	−0.01	[−0.09; 0.07]	−0.00	[−0.08; 0.07]	−0.00	[−0.10; 0.09]
	Work with youth	−0.04	[−0.17; 0.01]	−0.02	[−0.15; 0.05]	0.00	[−0.09; 0.11]	0.03	[−0.06; 0.16]	−0.00	[−0.08; 0.08]	0.01	[−0.08; 0.11]	0.04	[−0.02; 0.15]	−0.07	[−0.22; 0.00]
	Work with children	0.02	[−0.05; 0.12]	0.03	[−0.03; 0.16]	0.01	[−0.07; 0.12]	0.02	[−0.04; 0.16]	−0.01	[−0.09; 0.07]	−0.06*	[−0.19; −0.02]	−0.03	[−0.15; 0.01]	−0.02	[−0.14; 0.07]
	Prosocial behavior	0.09*	[0.02; 0.24]	0.08*	[0.01; 0.25]	0.12***	[0.08; 0.32]	0.07	[−0.03; 0.23]	0.10*	[0.00; 0.20]	0.01	[−0.10; 0.12]	−0.05	[−0.16; 0.04]	0.08	[−0.04; 0.23]
	Alternative choice	0.03	[−0.03; 0.14]	0.01	[−0.08; 0.11]	0.00	[−0.09; 0.09]	0.02	[−0.06; 0.14]	−0.03	[−0.12; 0.04]	0.02	[−0.06; 0.11]	0.02	[−0.04; 0.12]	0.00	[−0.10; 0.11]

L, leadership; H, helpful; US, understanding; STR, student-teacher responsibility; UC, uncertain; D, dissatisfied; O, objecting; S, strictness; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; β , standardized beta, 95% CI, 95% confidence interval.

$R^2 = 0.28$, $\Delta R^2 = 0.28$, $F(24,453) = 7.28$, $p < 0.001$. The student-teacher responsibility IS was predicted by lower extraversion and negative emotionality and higher open-mindedness, problems with behavioral regulation, and significant others and work potential as motivation; the overall model: $R^2 = 0.17$, $\Delta R^2 = 0.17$, $F(24,453) = 3.84$, $p < 0.001$.

The uncertain IS was predicted by lower extraversion, higher negative emotionality, problems with planning, time management and emotional regulation, lower self-perception of teaching skills and higher prosocial behavior as motivators; the overall model: $R^2 = 0.50$, $\Delta R^2 = 0.50$, $F(24,453) = 18.87$, $p < 0.001$. The dissatisfied IS was predicted by lower agreeableness, higher negative emotionality, problems with planning and lower preference for work with children; the overall model: $R^2 = 0.37$, $\Delta R^2 = 0.36$, $F(24,453) = 10.83$, $p < 0.001$. The objecting IS was predicted by lower agreeableness, higher negative emotionality, problems with emotional and behavioral regulation and benefits as a motivation for the teaching profession; the overall model: $R^2 = 0.46$, $\Delta R^2 = 0.45$, $F(24,453) = 15.71$, $p < 0.001$. Finally, only being a Czech student predicted the strictness IS along with agreeableness; the overall model: $R^2 = 0.13$, $\Delta R^2 = 0.11$, $F(24,453) = 2.31$, $p < 0.001$.

Similarly, Table 4 shows the results for teaching styles and didactic competencies as dependent variables. Being a Slovak student predicted all teaching styles. In addition, the TS manager was predicted by cognitive reflection, problems with emotional regulation, significant others and a lower preference for work with children as motivation; the overall model: $R^2 = 0.14$, $\Delta R^2 = 0.13$, $F(24,452) = 2.77$, $p < 0.001$. The knowledge-oriented TS was predicted by low scientific reasoning, problems with planning, good organization executive function, interest and prosocial behavior (and a lower preference for working with children) as motivations; the overall model: $R^2 = 0.20$, $\Delta R^2 = 0.14$, $F(24,452) = 3.26$, $p < 0.001$. The goal-oriented TS was predicted by conscientiousness and open-mindedness, lower previous experiences and a higher preference of prosocial behavior as motivation; the overall model: $R^2 = 0.22$, $\Delta R^2 = 0.17$, $F(24,452) = 4.03$, $p < 0.001$. Finally, supporting TS was predicted by conscientiousness and open-mindedness, scientific reasoning and prosocial behavior as motivation; the overall model: $R^2 = 0.27$, $\Delta R^2 = 0.25$, $F(24,452) = 6.36$, $p < 0.001$.

As for didactic competencies, better planning and preparation of a lesson was predicted by agreeableness and conscientiousness, interest, work with children and most strongly by prosocial behavior as motivation; the overall model: $R^2 = 0.34$, $\Delta R^2 = 0.32$, $F(24,450) = 9.17$, $p < 0.001$. Realization of a lesson was predicted by agreeableness and open-mindedness, scientific reasoning, interest, influence by significant others and most strongly by prosocial behavior as motivation; the overall model: $R^2 = 0.31$, $\Delta R^2 = 0.31$, $F(24,450) = 8.41$, $p < 0.001$. Building and maintaining the classroom climate was predicted by extraversion and agreeableness, cognitive reflection and scientific reasoning and most strongly by self-perception of teaching skills as motivation; the overall model: $R^2 = 0.37$, $\Delta R^2 = 0.36$, $F(24,450) = 10.88$, $p < 0.001$. Being a Slovak student predicted better diagnostics and evaluation along with higher open-mindedness and lower negative emotionality, problems with emotional regulation and most strongly by prosocial behavior as motivation; the overall model: $R^2 = 0.37$, $\Delta R^2 = 0.34$, $F(24,450) = 9.94$, $p < 0.001$. Finally, being a Czech student predicted better self-reflection along with agreeableness, problems with emotional regulation, interest and most strongly by prosocial behavior as motivation; the overall model: $R^2 = 0.19$, $\Delta R^2 = 0.19$, $F(24,450) = 4.37$, $p < 0.001$.

4 Discussion

The study was carried out on university students preparing for the teaching profession, because higher education and its application operates as a chain of events with a large temporal inertia. The consequences of similarities and differences and relationships will not become apparent for at least two decades, when the children taught by the teachers, we are now training enter higher education. In practical terms, this is the most influential part of the education system; thus, having enough information about this population can be an advantage in determining approaches at universities.

In the present study, we found several differences at the level and composition of professional competencies, motivation, personality and cognition of Slovak and Czech future teachers. For the present study, we selected pre-service teachers from departments (and faculties) in Slovakia and the Czech Republic that are very similar in their specialization and structure. This deliberate selection of the sample is both an advantage and a limitation of the study. The similarity of the departments allows us to capture the differences that are related to the education system of countries. On the other hand, the selection of only two departments limits the generalizability of the results (the findings should be considered in the context of this limitation).

4.1 Differences between Slovak and Czech pre-service teachers

To answer our first question regarding potential differences, a comparative analysis was conducted. First, Slovak pre-service teachers assessed themselves as more competent, with a more substantial intrinsic interest in the profession and stronger motivation to work with youth. Czech pre-service teachers showed higher motivation due to their previous experiences with the profession, the benefits and income of the teaching profession and being influenced (or modelled) by significant others. Previous studies showed similar results for Slovakian pre-service and in-service teachers (e.g., Tomšík and Gatál, 2018; Verešová et al., 2023). In addition, the OECD study (2005) showed that in Slovakia, France, Australia, Belgium, Canada, the Netherlands and the United Kingdom, internal motives, such as the desire to work with children and young people, the potential for intellectual fulfilment and the social motive, were the most frequently cited reasons for choosing the teaching profession. Our results show that extrinsic motives are strongly represented in the population of pre-service teachers in the Czech Republic. Better salary conditions in the Czech Republic (than in Slovakia) have a motivating effect on Czech students, as does external motivation from important reference persons, such as teacher role models or family members.

Secondly, in the tests used, the Czech pre-service teachers showed higher values in terms of cognitive abilities and executive functions than the Slovak pre-service teachers. In Slovakia, the low cognitive abilities of teaching domain students have been observed for a long time: several studies have identified low mediate cognitive reflection and scientific reasoning, as well as a low level of critical thinking (Čavojová and Jurkovič, 2017; Kosturková, 2013). A possible explanation for differences between Slovak and Czech future teachers in their cognitive abilities could be the process of admitting students to teacher training. In the Czech Republic (specifically at the

TABLE 4 Hierarchical regression with teaching styles and didactic competencies as dependent variables (standardized scores).

Step	IV	Teaching styles								Didactic competencies									
		M		KO		GO		S		PP		R		DH		TK		SR	
		β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI
1	State	0.16*	[0.02; 0.24]	0.17*	[0.01; 0.22]	0.19**	[0.04; 0.24]	0.17**	[0.04; 0.24]	0.05	[−0.04; 0.15]	0.07	[−0.03; 0.17]	0.13**	[0.05; 0.24]	0.06	[−0.03; 0.15]	−0.21*	[−0.23; −0.01]
2	Extraversion	0.01	[−0.10; 0.13]	0.02	[−0.09; 0.14]	−0.00	[−0.12; 0.11]	0.06	[−0.03; 0.18]	0.00	[−0.10; 0.11]	0.03	[−0.07; 0.14]	−0.03	[−0.15; 0.05]	0.11**	[0.05; 0.25]	0.01	[−0.11; 0.12]
	Agreeableness	−0.01	[−0.12; 0.09]	−0.01	[−0.11; 0.10]	0.07	[−0.04; 0.16]	0.21***	[0.11; 0.30]	0.15***	[0.08; 0.27]	0.08*	[0.01; 0.19]	0.06	[−0.01; 0.16]	0.13***	[0.07; 0.25]	0.22**	[0.04; 0.25]
	Conscientiousness	−0.06	[−0.20; 0.08]	0.08	[−0.06; 0.21]	0.16*	[0.03; 0.29]	−0.05	[−0.18; 0.07]	0.10*	[0.01; 0.25]	0.03	[−0.08; 0.16]	−0.03	[−0.15; 0.08]	0.08	[−0.01; 0.23]	0.08	[−0.07; 0.19]
	Negative emotionality	−0.10	[−0.25; 0.01]	−0.01	[−0.14; 0.12]	0.02	[−0.11; 0.15]	−0.00	[−0.13; 0.12]	0.01	[−0.10; 0.14]	−0.02	[−0.14; 0.10]	−0.08*	[−0.25; −0.02]	−0.01	[−0.13; 0.10]	0.02	[−0.11; 0.15]
	Open-mindedness	0.05	[−0.05; 0.17]	0.05	[−0.05; 0.15]	0.10*	[0.00; 0.21]	0.16***	[0.09; 0.28]	0.06	[−0.01; 0.17]	0.13***	[0.08; 0.27]	0.13***	[0.11; 0.29]	0.04	[−0.04; 0.14]	0.11	[−0.02; 0.19]
	Cognitive reflection	0.05***	[0.06; 0.25]	0.01	[−0.07; 0.11]	−0.02	[−0.14; 0.04]	−0.02	[−0.14; 0.03]	0.01	[−0.05; 0.11]	−0.01	[−0.13; 0.04]	−0.01	[−0.14; 0.02]	−0.03*	[−0.18; −0.02]	−0.01	[−0.11; 0.08]
	Scientific reasoning	−0.01	[−0.12; 0.08]	−0.12***	[−0.30; −0.10]	−0.05	[−0.18; 0.01]	0.05*	[0.00; 0.19]	0.02	[−0.05; 0.14]	0.04*	[0.01; 0.20]	0.03	[−0.00; 0.17]	0.04*	[0.01; 0.19]	−0.02	[−0.13; 0.07]
	Planning	0.12	[−0.02; 0.25]	0.17*	[0.01; 0.27]	0.04	[−0.09; 0.16]	0.03	[−0.09; 0.16]	−0.03	[−0.15; 0.08]	−0.01	[−0.14; 0.10]	−0.05	[−0.19; 0.04]	−0.06	[−0.19; 0.04]	−0.07	[−0.18; 0.08]
	Time management	−0.04	[−0.15; 0.07]	−0.03	[−0.14; 0.08]	−0.06	[−0.16; 0.05]	0.03	[−0.07; 0.13]	−0.05	[−0.17; 0.03]	0.01	[−0.08; 0.12]	0.00	[−0.09; 0.10]	−0.06	[−0.19; 0.00]	−0.01	[−0.11; 0.10]
	Organization	−0.03	[−0.16; 0.06]	−0.09*	[−0.24; −0.03]	−0.01	[−0.13; 0.08]	−0.04	[−0.16; 0.04]	−0.05	[−0.20; −0.01]	−0.03	[−0.17; 0.02]	−0.03	[−0.17; 0.02]	−0.00	[−0.10; 0.09]	0.05	[−0.04; 0.17]
	Emotional regulation	0.10*	[0.02; 0.24]	−0.03	[−0.14; 0.08]	0.06	[−0.03; 0.18]	0.07	[−0.01; 0.20]	0.05	[−0.02; 0.18]	0.02	[−0.07; 0.13]	0.07*	[0.02; 0.21]	−0.01	[−0.11; 0.09]	0.12*	[0.00; 0.22]
	Behavioral regulation	0.06	[−0.03; 0.16]	0.05	[−0.05; 0.13]	0.05	[−0.05; 0.13]	0.00	[−0.08; 0.09]	0.03	[−0.05; 0.12]	0.00	[−0.08; 0.09]	0.05	[−0.01; 0.15]	0.04	[−0.03; 0.13]	0.09	[−0.03; 0.16]
	Interest	−0.01	[−0.13; 0.10]	0.09**	[0.06; 0.28]	0.03	[−0.05; 0.17]	−0.00	[−0.12; 0.10]	0.07***	[0.09; 0.29]	0.07***	[0.07; 0.28]	0.02	[−0.05; 0.15]	−0.03	[−0.19; 0.01]	0.08*	[0.00; 0.23]
	Self-perception of teaching skills	0.07	[−0.03; 0.22]	−0.04	[−0.17; 0.08]	0.01	[−0.11; 0.14]	0.00	[−0.11; 0.13]	−0.03	[−0.16; 0.07]	0.07	[−0.00; 0.23]	0.05	[−0.02; 0.20]	0.16***	[0.15; 0.37]	−0.12	[−0.24; 0.01]

(Continued)

TABLE 4 (Continued)

Step	IV	Teaching styles								Didactic competencies									
		M		KO		GO		S		PP		R		DH		TK		SR	
		β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI
	Work potential	0.03	[−0.07; 0.16]	−0.06	[−0.19; 0.04]	−0.09	[−0.22; 0.00]	0.02	[−0.09; 0.13]	−0.02	[−0.13; 0.07]	−0.04	[−0.17; 0.04]	−0.02	[−0.14; 0.06]	−0.03	[−0.15; 0.05]	0.03	[−0.09; 0.14]
	Previous experiences	−0.00	[−0.10; 0.09]	−0.04	[−0.17; 0.02]	−0.07**	[−0.23; −0.05]	−0.00	[−0.10; 0.08]	−0.00	[−0.10; 0.08]	−0.02	[−0.16; 0.02]	0.01	[−0.06; 0.11]	0.01	[−0.07; 0.10]	−0.01	[−0.11; 0.08]
	Social status	−0.01	[−0.12; 0.08]	0.03	[−0.06; 0.14]	0.06	[−0.01; 0.18]	−0.02	[−0.12; 0.07]	−0.02	[−0.13; 0.05]	−0.03	[−0.15; 0.03]	0.02	[−0.05; 0.13]	0.05	[0.01; 0.18]	0.03	[−0.07; 0.13]
	Benefits	0.04	[−0.04; 0.14]	0.00	[−0.09; 0.09]	0.00	[−0.09; 0.09]	−0.02	[−0.12; 0.06]	−0.05	[−0.16; 0.00]	−0.03	[−0.13; 0.04]	−0.01	[−0.11; 0.05]	−0.01	[−0.10; 0.07]	−0.06	[−0.15; 0.04]
	Income	−0.04	[−0.17; 0.04]	0.05	[−0.03; 0.17]	0.06	[−0.02; 0.18]	0.00	[−0.10; 0.10]	0.01	[−0.07; 0.12]	0.01	[−0.07; 0.12]	−0.01	[−0.11; 0.08]	−0.02	[−0.13; 0.05]	0.01	[−0.09; 0.12]
	Significant others	0.06*	[0.01; 0.20]	0.05	[−0.00; 0.18]	0.02	[−0.05; 0.12]	0.01	[−0.06; 0.11]	0.02	[−0.03; 0.13]	0.03*	[0.00; 0.17]	0.04	[0.02; 0.18]	0.01	[−0.05; 0.11]	0.06	[−0.01; 0.17]
	Work with youth	0.03	[−0.07; 0.15]	−0.03	[−0.15; 0.07]	−0.01	[−0.12; 0.09]	0.04	[−0.03; 0.17]	−0.03	[−0.15; 0.04]	−0.03	[−0.16; 0.04]	0.01	[−0.07; 0.12]	−0.02	[−0.14; 0.05]	−0.01	[−0.11; 0.10]
	Work with children	−0.08**	[−0.25; −0.04]	−0.09**	[−0.24; −0.04]	−0.04	[−0.17; 0.02]	0.04	[−0.01; 0.18]	0.05**	[0.04; 0.22]	0.03	[−0.01; 0.17]	0.03	[−0.02; 0.16]	−0.02	[−0.13; 0.04]	0.01	[−0.08; 0.11]
	Prosocial behavior	0.08	[−0.03; 0.23]	0.26***	[0.13; 0.38]	0.26***	[0.15; 0.40]	0.13**	[0.03; 0.27]	0.20***	[0.18; 0.41]	0.17***	[0.14; 0.38]	0.17***	[0.15; 0.38]	0.06	[−0.03; 0.20]	0.33***	[0.14; 0.40]
	Alternative choice	0.03	[−0.06; 0.15]	−0.01	[−0.11; 0.09]	0.02	[−0.06; 0.13]	−0.00	[−0.10; 0.09]	0.04	[−0.01; 0.17]	0.02	[−0.05; 0.13]	0.02	[−0.05; 0.13]	−0.02	[−0.12; 0.05]	−0.02	[−0.13; 0.07]

S, supporting; GO, goals-oriented; KO, knowledge-oriented; M, manager; PP, planning and preparation; R, realization, C, classroom climate; D, diagnostics and evaluation; SR, self-reflection; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; β, standardized beta, 95% CI, 95% confidence interval.

university participating in the study), teacher training is conditional upon passing a general prerequisites test and a test of verbal reasoning and logical thinking, and only 20% of applicants are accepted. In Slovakia (specifically at the university participating in the study), all applicants were accepted for training. This process probably favors the Czech student population in our tests of cognitive ability. They are already a sample that had to go through the admission process, and logically better results can be expected than for the Slovak unstratified population. This does not necessarily mean that there is a difference between the Czech and Slovak population in general. It is merely an objective reflection of the results of the sample. Large differences in competence scores between the Czech, Slovak, Polish and Ukrainian populations of pre-service teachers are also described in [Kruszewska et al. \(2021\)](#), so our result is not unique.

Third, we identified differences in personality traits: Czech pre-service teachers had stronger neuroticism, and Slovak pre-service teachers had stronger traits of agreeableness and conscientiousness. As stated by [Hartmann and Ertl \(2021\)](#), in the context of the existing relationships of the Big Five personality characteristics to various performance characteristics of the teaching profession (for example career success, interpersonal interaction with students/others, social support to students by teachers, teacher's effectiveness, etc.), it is also important to consider how applicants for teaching training differ from applicants for the same orientated non-teaching domain. The above stresses the analysis of the motives for teaching studies versus scientific studies, as well as an analysis of the set of desirable motives for undergraduate teacher training. In our research, we did not analyze this approach; we focused on the analysis of differences between Slovak and Czech pre-service teachers and found differences tied to the existence of and, consequently, different strengths of the relationships of personality traits to professional competencies. We suppose that differences in the motives for choosing the teaching profession (Slovak pre-service teachers indicated a higher intrinsic interest in the profession and stronger motivation to work with youth; Czech pre-service teachers were strongly motivated by their previous experiences, benefits and the income of the teaching profession and by significant others) can explain it; motivation is supposed to mediate or moderate the relationship between personality traits and professional competencies.

While the observed differences in didactic and cognitive competencies may partly reflect the selection criteria for teacher education in Slovakia and the Czech Republic, we are aware that other factors may also contribute to these results. Differences in national pedagogical approaches, academic workload expectations and assessment practices may shape the development of pre-service teachers' competencies. For example, Slovak teacher training programs may place a stronger emphasis on applied didactics, while Czech programs emphasize theoretical or cognitive development. The structure and intensity of the academic workload could have an impact on students' opportunities to develop specific competencies. Different assessment methods — such as the assessment of practical teaching compared to written examinations — could also lead to differences in the acquisition of competencies. These factors should be further investigated empirically to better understand cross-national differences in teacher preparation. Future studies should consider a wider range of institutional and curricular variables to contextualize the competence development in pre-service teachers.

4.2 Relationships between professional competencies and other factors

Probably due to the differences mentioned above, different patterns of correlations between professional competencies and motivation, personality and cognitive abilities were also seen. We have thus analyzed how each factor — including nationality — predicts professional competencies. As for interaction styles, we found that it does not matter whether the students are Slovak or Czech if other personality traits or cognitive and motivational factors play a role. The fact that the student was Slovakian, on the other hand, was associated with a more developed teaching style and the didactic competencies of diagnostics/evaluation and self-reflection. Despite the different correlation patterns for Slovakian and Czech students, the regression thus shows that the country of origin only plays a role for the teaching styles and some didactic competencies. This indicates that there are probably differences in the education system between the countries, but it also suggests that other factors (e.g., personality, executive functions or motivation for the profession) play a greater role than the question of how and where the future teacher is trained.

Of the personality traits, agreeableness, negative emotionality and open-mindedness were relatively strong factors associated with professional competencies. Agreeableness was positively related to a higher preference for interaction styles that tend to lead to positive interaction with students (and a lower preference for interaction styles that tend to lead to negative interaction with students) and was also related to a predisposition for developing didactic competencies (with the exception of diagnostics and evaluation). Next, negative emotionality was associated with a higher preference for interaction styles more prone to negative interaction with students (except for the strict style), and open-mindedness was positively related to goal-oriented and supportive teaching styles and didactic competencies realization and classroom climate.

The relationships between cognitions (cognitive reflection and scientific reasoning) and professional competencies were not consistent. These inconsistencies were probably caused by the general low level of cognitive reflection and scientific reasoning of future teachers. Much more consistent associations were observed for the executive functions when talking about interaction styles; our results indicate that executive functions may not play as much of a role in the interaction styles that tend towards positive interactions (compared to other factors) as their absence in interaction styles that tend towards negative interactions.

Finally, in terms of motivation for choosing the teaching profession, how our future teachers would teach (teaching styles) and how they would approach teaching (didactic competencies) were closely related to their motivation as a preference for prosocial behavior. Interaction styles were less related to motivation (the perception of one's own predisposition to teach and preference for prosocial behavior were related to the leadership style and helpful style; prosocial behavior was also related to the understanding style and, negatively, to the uncertain style).

4.3 Implications

The shared history and the non-violent division of the Czech and Slovak Republics are unique in their own way. After a few

decades, however, the different trajectories of their development can be observed, and it seems that this also applies to education. In the last fifty years, only in a few cases has there been a relatively peaceful division of national states, and only in a few cases have there been no conflicts after such a division preventing cross-border scientific co-operation at a good level. We found a comparative study among 23 European countries (including the Czech Republic and Slovakia) conducted by [Federičová \(2021\)](#) but focused only on the motivation to become a teacher. To our knowledge, there are no comparable studies from other post-partition countries that would document changes in the development of higher education. This study offers a rare comparative perspective on how systemic, cultural and educational differences influence teacher preparation. By linking these factors to professional competences, the study offers a nuanced understanding of teacher education from which personalized and evidence-based education practices can emerge. Since teacher education is taking on European dimensions, it is necessary to know possible similarities and differences between countries.

Our results show that there are differences between Slovakian and Czech students which can be attributed to the different orientation of the education systems in Slovakia and the Czech Republic. However, our results show that there are stronger factors than country that are related to the development of future teachers' professional competencies. In some ways, this is good news because, at least in the countries we analyzed, the education systems for teacher development and training are more or less the same. The factors that play a role are mainly personality traits and the motivation to choose the teaching profession. Therefore, these factors should be considered when selecting applicants for the teaching profession (some faculties of education do not have entrance examinations) and they should be developed and encouraged during the teacher training program. Our findings also support current educational trends that focus more on the European dimension. A good example is the European Primary Teacher Education project in several European countries (Sweden, Portugal, the Netherlands, Slovenia, Slovakia, Poland and Austria)—a one semester study program for primary teacher education students—which aims to help teacher education in different European countries to break through in several scientific fields (society, culture and education, multilingual and intercultural education, environment and sustainable development, math, arts, pedagogy and didactics; [Kurincová and Klimentová, 2016](#); [Stütz, 2015](#)).

Our findings also offer some suggestions for practice in the countries analyzed. In Slovakia, customized measures in teacher education may be needed to improve the lower level of cognitive skills (especially scientific reasoning) of future teachers, for example, through the introduction of critical thinking courses into study programs. On the other hand, Slovakian students showed stronger didactic competences and self-reflection. These strengths can be exploited through training modules that focus on reflective practices and student-centered teaching. In addition, the role of executive functions in teaching suggests that teacher education programs should integrate activities that strengthen these cognitive skills, such as task management, problem-solving simulations and decision-making exercises. And since executive functions have a stronger influence on negative interaction styles, interventions aimed at improving impulse control and reflective practices may prevent counterproductive teaching behavior.

Next, fostering intrinsic motivation may have lasting benefits for professional effectiveness and satisfaction in both Slovak and Czech future teachers. As Slovakian pre-service teachers showed higher intrinsic motivation to work with young people, Slovakian training programs may integrate a more student-centered, prosocial teaching style. In contrast to the Slovaks, Czech pre-service teachers' motivation was tied to external factors (e.g., income, significant others), suggesting that programs could increase intrinsic motivation through structured practicum experiences that deepen their connection to the social and intellectual rewards of the teaching profession. School visits, running leisure clubs or involving students in project could be organized for this purpose. These experiences link theory with practice and strengthen students' motivation when they have real contact with children in school. On the other hand, Czech teachers motivated by extrinsic factors might benefit from mentors and role models to cultivate long-term intrinsic motivation.

In addition, negative emotionality in Czech teachers was associated with interaction styles that are prone to negativity. Training programs should include the development of emotional intelligence, stress management and positive interaction strategies to mitigate this. On the other hand, agreeableness and open-mindedness are associated with a prosocial and goal-orientated teaching style. These traits can be fostered through co-operative learning environments and diversity training. Finally, socio-psychological training that focuses on working with emotionality, emotion and behavior regulation should be included in teacher training programs to improve the skills of future teachers.

4.4 Limits and future research

The present study faced some limitations. Only students in training for teaching for lower and upper secondary grades, whose professional competencies may not yet be fully developed, participated. Therefore, it would be more accurate to talk about their predispositions to professional competencies. It is possible that extending the research to students from other teaching domains would produce different results and also different patterns of relationships of professional competencies. Next, we included in the analyses only students in their first years of study; thus, their professional competencies may not yet be fully developed. Our ambition is to stay in touch with these students during and after their studies (during their professional careers) and examine changes in their professional competencies and changes in relationships of professional competencies with their covariates. The follow-up of the present research could help to verify whether the relationships we measured were not just false correlations. Research on in-service teachers (in comparison to pre-service teachers) would also bring significant findings; this is another possible direction of future research.

Although distinguishing intrinsic, extrinsic and alternative motivation is a well-established approach, deciding which specific motivations belong to specific groups is problematic. [Sardana et al. \(2021\)](#) identified a large number of other individual motivators as well as demotivation in their studies. Such motivators were, for example, safe infrastructure, not being involved in administration or support for excellent work. Demotivators were, for example, contract work. [Klimek \(2019\)](#) identified a lack of respect for the teaching profession

or devaluation of the value of the teaching profession by low salaries as demotivators in the American context. Similarly, Taimalu et al. (2021) identified such demotivation in Finnish and Estonian teaching domain students.

Given the temporal inertia of the proposed implications and interventions, longitudinal studies that track the impact of these teachers on student outcomes are crucial for evaluating and improving teacher education programs.

5 Conclusion

The Czech and Slovak Republics have a long common history, which is reflected in their education systems, culture and values, as they were a single country up through 1992. This similarity provides a solid basis for comparison, as both systems were built on similar foundations, even though they have developed differently since the division of the federation. Despite the common historical roots, the education systems in both countries have gradually diverged since the division. On the other hand, it is psychological factors that play a role in the formation of teachers' professional competences and not the country in which future teachers are trained. However, comparing the competencies of teachers does make it possible to see how similarities and differences in the systems have affected the quality of and access to teaching, which may be useful in shaping future reforms.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/supplementary material.

Ethics statement

The studies involving humans were approved by Ethics Committee of Constantine the Philosopher University in Nitra. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

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EB: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Resources, Software, Visualization, Writing – original draft, Writing – review & editing. MV: Conceptualization, Funding acquisition, Project administration, Resources, Writing – review & editing. VG: Conceptualization, Investigation, Writing – review & editing. RB: Conceptualization, Writing – review & editing. TK: Conceptualization, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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