Professional Competencies and Cognitive Abilities of Teachers

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Abstract
The teaching profession depends on skills and professional competencies, which can be summarized under the term professional competence. Professional competencies entitle the teacher to perform skilled activities as teachers. In the present study, we investigated which cognitive skills support better development of professional competencies. The main aim of the study was to examine the relationship between teachers' professional competencies and their cognitive abilities. A total of 591 teachers aged 20 – 72 years (M=43.56, SD=10.92) participated in the study. Teachers' professional competencies were measured using the Teacher Interaction Questionnaire, the Slovak Teaching Style Questionnaire, and the Didactic Competencies Questionnaire. Cognitive abilities were measured as critical thinking disposition (using the Critical Thinking Disposition Scale), scientific trust (using the Credibility of Science Scale), and psychological misconceptions (using the Psychological Information Questionnaire). Results (controlled for age and practice) showed positive relationships between critical thinking disposition and the interaction styles of leadership, helpfulness, understanding, and student-teacher responsibility (r= .382 - .502), alongside with didactic competencies (planning and preparation, realization, classroom climate, diagnosis and evaluation, and self-reflection; r= .410 - .731) and with managerial and supporting teaching styles (r= .404 - .709). There were no associations with scientific trust or psychological misconceptions. The findings suggest the importance of supporting the development of critical thinking during undergraduate teacher education to promote the development of professional competencies.

Keywords: Professional Competence, Cognitive Ability, Teacher

Introduction

The teaching profession depends on skills and professional competencies, which can be summarized under the term professional competence. Professional competencies entitle the teacher to perform skilled activities as teachers. The teaching profession is one of the most complex professions in today's society, and the same complexity is therefore expected of teachers' professional competencies (Zuljan et al., 2012). Professional competencies include knowledge, skills, values, attitudes, motives, and personality traits that are manifested in a certain characteristic behavior that influences the quality of performance and work activity. A teacher's behavior in school also affects his/her way of thinking, teaching style, experience, teaching approach, self-perception in the role of a teacher, ability to self-reflect, motivation to choose the teaching profession, interest, motivation to develop, and more. (Darák et al., 2007; Verešová, 2023; Verešová et al., 2023). Although there is no consensus on teachers' professional competencies, it is still possible to summarize teachers' professional competencies as a set of different abilities, skills, dispositions, attitudes, and knowledge that support teachers' effective work (Moreno-Murcia et al., 2015). In the present study, we based concept of professional competencies on the competence model (Kasáčová, 2006; Kasáčová et al., 2006) created in Slovak cultural and legislative environment: (1) student-centered competencies, (2) teacher self-development competencies and (3) competences oriented toward educational processes.

We have focused on competencies oriented toward educational processes, specifically on interaction and teaching styles and didactic competencies. *Didactic competencies* are competencies related to planning, organizing, managing, evaluating, and implementing the teaching process (Rovňanová, 2015), having knowledge of pedagogy and psychology (Šuťáková, 2017). Preferred *teaching style* represents the way a teacher performs and manages tasks, processes and also communicates and socializes with students (Ford et al., 2016; Grasha, 2002; Mohanna et al., 2007). In present study, we focused on supportive, goal-oriented, knowledge-oriented and managerial teaching styles revealed in previous research (Ballová Mikušková, 2022) based on studies of Mohanna et al. (2007) and on the Grasha-Reichmann model (Ford et al., 2016; Grasha, 2002). Finally, we examined the *interaction styles* as a way of teachers' interaction, behavior and communication, especially with students. Based on Leary's model of personality (Leary, 1957) and the model of teacher interaction behavior (Wubbels et al., 1987), the interaction style represents eight aspects of teacher behavior: organization, help, understanding, responsibility, uncertainty, dissatisfaction, rebuke, and severity.

Research shows that professional competencies could relate to psychological literacy, the knowledge and adaptive use of psychological constructs including critical psychological thinking (Sokolová, 2018; Sokolová et al., 2017). The present study is part of a larger research in which the relationship between professional competencies and psychological literacy is investigated. So, in the present study, we investigated which cognitive abilities, as components of psychological literacy (critical thinking disposition, scientific trust and psychological misconceptions), support better development of teachers' professional competencies.

There is a lack of research regarding the relationship between professional competencies and cognitive abilities, as components of psychological literacy. In general, cognitive abilities appeared as a positive covariate of professional competencies (Čavojová & Jurkovič, 2017a, 2017b; Jursová Zacharová et al., 2019). Similarly, scientific reasoning skills should promote

goals of education (Kuhn et al., 1988) because well-developed scientific reasoning is useful for in-depth understanding (Krell et al., 2020). We focused on critical thinking as one component of psychological literacy, but the research on the relationship with professional competencies of teachers is missing.

In professional competencies' development, the trust in science—knowledge of key psychological terms and concepts, as well as skills to apply psychological knowledge to life (Boneau, 1990; O'Hara, 2007)—can play an important role. Indeed, when teachers have trust in science, they value science and technology, reject pseudoscience, and teach the population competently (Fuertes-Prieto et al., 2020). Trust in science seems to be connected more with the educational content that with professional competencies in general, similarly are psychological misconceptions. There is a high prevalence of some psychological misconceptions among teachers and also students (e.g., Bensley & Lilienfeld, 2017; Menz et al., 2021) and research show that because misconceptions are resistant to instruction, they are a barrier in teaching (for review see e.g., Bensley et al., 2014), and it can be assumed that they could also interfere with professional competencies of teachers.

Since the results regarding the relationship between professional competencies and cognitive abilities, as components of psychological literacy, are ambiguous, we conducted exploratory research. The main aim of the study was to examine the relationship between teachers' professional competencies and their cognitive abilities. In the cross-sectional study we focused on examination of potential associations between professional competencies and cognitive abilities.

Methods

A total of 591 in-service teachers (89% women) aged 20 – 72 years (M=43.56, SD =10.92) participated in the study. Participants were asked to participate through e-mail sent to directors of all elementary and high schools in Slovakia. The survey was conducted online on the Survio platform and data were collected in the fall of 2022. After signing a consent form, all participants filled out questions about their age, sex, professional competencies, and cognitive abilities. Participation was voluntary and anonymous, and as a reward for participation, we sent vouchers to 10 participants drawn to purchase books. The study was carried out following ethical principles introduced by the American Psychological Association.

To assess teachers' professional competencies, we asked participants to rate their preferred interaction styles, teaching styles and didactic competencies.

Interaction styles were measured using the modified Slovak version of the Questionnaire on Teacher Interaction (QTI). In the original version of the QTI (Gavora et al., 2003; Wubbels & Levy, 2005), students evaluate their teachers, and each teacher receives a score for each of the eight sectors of teacher behavior based on Leary's personality model: leadership, helpful, understanding, student-teacher responsibility, uncertain, dissatisfied, objecting, and strict. The present study used a modified version of the Questionnaire on Teacher Interaction – Self-assessment (QTI-S), adapted for teacher self-assessment (Ballová Mikušková, 2022; Verešová, 2021). This instrument includes 40 statements about teacher behavior, which are rated on a five-point Likert scale (1 = never; 5 = always).

Teaching styles were measured with the Slovak Teaching Style Questionnaire (STSQ; Ballová Mikušková, 2022), which is a combination of items from the Teaching Style Inventory (Ford et al., 2016; Grasha, 2002) and the Staffordshire Evaluation of Teaching Styles (Mohanna et al., 2007). This instrument included 20 items rated on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). The average scores for the four teaching styles (supporting, goal-oriented, knowledge-oriented, and managerial) were computed.

Didactic competencies were measured using the Didactic Competencies Questionnaire (DCQ; (Ballová Mikušková, 2022; Rapsová et al., 2021, in Verešová et al., 2023). This instrument included 57 items on teaching behavior in five phases of teaching (planning and preparation, realization, classroom climate, diagnostics and evaluation, and self-reflection), which are rated on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree).

Cognitive abilities were measured as disposition to critical thinking, scientific trust and psychological misconceptions.

Critical thinking disposition was measured using the Critical Thinking Disposition Scale (CTSQ; Sosu, 2013). Participants were required to rate 11 statements on a 5-point scale (1 – I strongly disagree, 5 – I strongly agree). The items focus on two dispositional domains – critical openness (7 items; the ability to change one's views and thinking as a result of convincing evidence) and reflective skepticism (4 items; the individual's ability to look at information critically, question evidence and learn from past experiences). A higher mean score indicates greater critical openness and reflective skepticism.

To measure trust in science, we used the Credibility of Science Scale (CSS; Hartman et al., 2017). Participants had to rate 6 statements on a 5-point scale (1 – I strongly disagree, 5 – I strongly agree). The higher the average score, the greater the scientific trust.

Psychological misconceptions were measured using the Slovak version of the Psychological Information Questionnaire (PIQ; Kowalski & Taylor, 2009; Sokolová et al., 2017) The version of the PIQ used consisted of 25 items – psychological mis/information. Participants had to assess whether the information was true or false. For each correct answer, participants received 1 point. The higher the average score, the lower the belief in psychological misinformation.

Results

The descriptive statistics of the measures of professional competencies and cognitive abilities are shown in Table 1. The most preferred interaction styles were helpful, leading to responsibility, leadership and understanding. All didactic competencies were well developed, and teachers preferred a supportive teaching style. Teachers had high disposition to critical thinking and a medium trust in science. And belief in psychological misconceptions was high.

Table 1: Descriptive statistics of professional competencies and cognitive abilities of teachers

		M	SD	min	max
interaction styles	*leadership*	4.27	0.56	1.00	5.00
	helpful	4.49	0.57	1.00	5.00
	understanding	4.27	0.56	1.20	5.00
	student-teacher responsibility	4.40	0.56	1.00	5.00
	uncertain	1.94	0.69	1.00	4.60
	dissatisfied	2.14	0.60	1.00	4.60
	objecting	1.72	0.60	1.00	4.20
	strict	3.90	0.65	1.00	4.80
didactic competencies	*planning and preparation*	4.14	0.50	2.15	5.00
	realisation	4.80	0.48	2.19	5.00
	climate in class	4.39	0.51	2.86	5.00
	diagnostics and evaluation	4.90	0.54	2.00	5.00
	self-reflection	4.14	0.74	1.40	5.00
teaching styles	*manager*	3.66	0.63	2.00	5.00
	knowledge-oriented	3.34	0.79	1.00	5.00
	goals-oriented	3.92	0.70	1.50	5.00
	supporting	4.21	0.67	1.00	5.00
critical thinking disposition	*critical openness*	4.23	0.51	2.71	5.00
	reflective scepticism	4.25	0.61	1.75	5.00
scientific trust		3.53	0.91	10.00	5.00
psychological misconceptions		0.38	0.13	00.04	0.79

Note: M – mean, SD – standard deviation, min – minimum, max – maximum

Relationships between professional competencies and cognitive abilities of teachers were measured by correlation analysis (Table 2). Results (controlled for age and practice) showed positive relationships between critical thinking disposition and the interaction styles of leadership, helpfulness, understanding, and student-teacher responsibility (r= .382 - .502), alongside with didactic competencies (planning and preparation, realization, classroom climate, diagnosis and evaluation, and self-reflection; r= .410 - .731) and with managerial and supporting teaching styles (r= .404 - .709). There were no associations with scientific trust or psychological misconceptions.

Table 2: Relationships between professional competencies and cognitive abilities of teachers

control variables: *age, practice*		critical thinking disposition		scientific trust	psychol. misconcep.
		critical openness	*reflective scepticism*		
interaction styles	*leadership*	.457***	.403***	-.104	-.102
	helpful	.480***	.481***	.089	-.060
	understanding	.502***	.382**	.127	.138
	student-teacher responsibility	.472***	.492***	.157	.038
	uncertain	-.158	.126	-.250*	-.230
	dissatisfied	-.055	.075	-.011	.035
	objecting	-.177	-.030	.048	-.008
	strict	.076	.071	-.187	.000
didactic competencies	*planning and preparation*	.515***	.470***	-.002	.082
	realisation	.731***	.546***	.088	.119
	climate in class	.634***	.410***	.069	.007
	diagnostics and evaluation	.692***	.469***	-.011	-.055
	self-reflection	.582***	.502***	-.089	.118
teaching styles	*manager*	.603***	.404***	.113	-.098
	knowledge-oriented	.243	.352**	-.193	-.361
	goals-oriented	.344**	.249	-.146	-.178
	supporting	.709***	.576***	-.112	-.231

Discussion

In the present study, we aimed to examine the relationship between teachers' professional competencies and their cognitive abilities. In the cross-sectional study we found relationship between dispositions to critical thinking (critical openness and reflective scepticism) and desired interaction styles (leadership, helpful, understanding, and leading to responsibility). Similarly, all didactic competencies and teaching styles were associated with critical thinking dispositions (except no relation between critical openness and knowledge-oriented, and reflective scepticism and goal-oriented style). These connections can be explained by the very definition of what critical thinking disposition are. Critical thinking dispositions is the way people reason, argue, make decisions, are open to new ideas, learn from new experiences, take a critical view when evaluating ideas, etc. This enables teachers to better understand the subject matter, critically assess information, reveal relationships and connections between individual phenomena, form opinions and attitudes towards the given issues (Sosu, 2013; Zormanová, 2012).

Surprisingly, there were no relationships with scientific trust and psychological misconceptions. On the other hand, important finding was high belief in psychological misconception of teachers which could be explained by moderate teachers' cognitive abilities (Ballová Mikušková, 2018; Čavojová & Jurkovič, 2017b, 2017a). Although our findings are in line with previous results of (Bensley & Lilienfeld, 2017; Menz et al., 2021) which show that teachers in training had psychological misconceptions about school practice, these

findings could be alarming. As authors point out, the pedagogical-psychological misconceptions can negatively affect the procedures and strategies used in their pedagogical activity (e.g., diagnosis and assessment). A solution is offered in the form of psychological courses aimed at developing cognitive skills, from analytical to critical thinking. For example, Cho (2022) found students engaged in analytic thinking as less likely subjected to psychological misconceptions.

Conclusion

Teacher education should continue to focus on the development of professional competencies and new skills, especially psychological literacy (Sokolová et al., 2014, 2017) as one of the most important 21st century literacy skills (Cranney et al., 2022; Hulme & Cranney, 2021). Based on our findings, special attention should be paid to the development of critical thinking during the education of student teachers, as this could enhance the development of their professional competencies.

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