TEACHERS' GROWTH MINDSET, SELF-EFFICACY AND THE MEANINGFULNESS OF TEACHING: A TWO SAMPLE STUDY

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ABSTRACT

Objectives. Despite extensive research on the effects of teachers' growth mindset (i.e., a belief that students' abilities are malleable qualities that can be developed through effort and practice) on student outcomes, limited studies have considered how teachers' growth mindset affects teachers' work experiences.

Sample and settings. Authors assessed the relationships among teachers' mindset, self-efficacy and the perceived meaningfulness of teaching in two studies: a survey of novice Czech teachers conducted by the Ministry of Education, Youth and Sports (Study 1, n=1447) and a representative study including all second-level teachers from 150 Czech elementary schools (Study 2, n=1768).

Hypotheses. Based on the social-cognitive framework, hypotheses were tested regarding a positive association between teacher' growth mindset, teacher' self-efficacy and the perceived meaningfulness of teaching, both direct and with teacher' self-efficacy playing a mediating role.

Statistical analyses. Hypotheses were tested within a structural equation modeling framework.

Results. In both studies, structural equation mod-

eling supported the hypotheses regarding the direct relationships between teachers' growth mindset, teachers' self-efficacy, and the perceived meaningfulness of teaching. While both studies revealed a significant mediation effect of self-efficacy in the relationship between teachers' mindset and perceived meaningfulness, the effect was small. The models explained 6.5% (Study 1) and 19.8% (Study 2) of variance in perceived meaningfulness of teaching. The total effects of teachers' growth mindset on meaningfulness of teaching were β =.145 (Study 1) and β =.182 (Study 2), while the effects of teachers' self-efficacy were β =.210 (Study 1) and β =.429 (Study 2). The findings suggest that both teachers' growth mindset and self-efficacy contribute to a positive teaching experience.

Limitations. The limitations of the study include a cross-sectional design, self-report measures and a limited number of variables included in the analysis.

key words:

mindset, teachers' self-efficacy, meaningfulness of teaching, structural equation modeling

INTRODUCTION

When students develop because of teachers' actions, the teachers generally feel that they are positively contributing to students' lives and, consequently, experience an increased sense of efficacy and meaningfulness that validates their efforts (Brunzell et al., 2018; Fourie & Deacon, 2015; Turner & Thielking, 2019; Shoshani, 2021).

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However, what if teachers believe that some students are unable to progress beyond a certain point in their learning because of insufficient levels of intelligence or abilities? How would this affect the ways in which teachers see themselves and their work? To answer these questions, we explored the relationships among teachers' mindsets (i.e., teachers' beliefs about the nature of students' abilities), teachers' self-efficacy (i.e., perceptions of their competence as teachers), and a sense of meaningfulness of their work.

As a point of departure, we used the concept of teachers' mindset (Dweck, 2017; DeLuca et al., 2019; Mesler et al., 2021; Seaton, 2018; Yeager et al., 2022), which juxtaposes two competing teachers' perceptions of the nature of student abilities. From one perspective, teachers may perceive students' abilities as relatively fixed entities that constitute a possible barrier to learning; from another perspective, teachers may perceive students' abilities as malleable qualities that can be developed through effort and practice. We argue that teachers' beliefs about the nature of students' abilities provide teachers with a sense-making framework that may shape their interpretations of their work experiences, affecting their self-efficacy (Klassen & Tze, 2014; Lüftenegger & Muth, 2024; Perera & John, 2020; Schunk & DiBenedetto, 2020; Skaalvik & Skaalvik, 2010) and their perception of teaching as meaningful work (Martela & Pessi, 2018; Martela & Riekki, 2018). In this way, we sidestep the dominant focus of the current mindset research on the educational effects of teachers' mindsets (DeLuca et al., 2019; Mesler et al., 2021; Seaton, 2018; Yeager et al., 2022) and focus on possible relationships between teachers' mindsets and the ways in which they perceive their work. This approach is even more innovative in the Czech context, in which, to our knowledge, only one paper has explored the role of teachers' mindsets as a condition of quality teaching (Straková & Simonová, 2015).

For mindset theory, adaptive beliefs about the nature of ability have been considered important facilitators of successful learning development (Blackwell et al., 2007; Dweck, 2000, 2017; Dweck & Leggett, 1988; Dweck & Yeager, 2019). From this perspective, the key attribute that shapes educational decisions, effort, persistence and reaction to failure is what qualities learners attribute to their abilities, i.e., whether they consider their abilities to be relatively stable and unchangeable or malleable and susceptible to being changed by effort. Dweck (2017) labelled these two competing frameworks through which learners make sense of their learning experiences as a "fixed mindset" and a "growth mindset". Learners with a fixed mindset are often preoccupied with appearances, endorse performance-avoidant goals and have fewer adaptive attributions and beliefs about effort, which impair their learning; learners endorsing a growth mindset are more preoccupied than other learners with learning and endorse more adaptive goals and beliefs, which facilitates their learning (Dweck & Yeager, 2019).

There has been a debate over the actual effects of mindsets, as some studies have failed to replicate the results of mindset research (Burgoyne et al., 2020; Li & Bates, 2019; Yeager & Dweck, 2020), and others have found the effects of mindset only in some groups of students (Bernardo, 2021; King & Trinidad, 2021). However, recent meta-analyses and large-scale research have suggested that learners with growth mindsets exhibit numerous positive characteristics, such as higher levels of self-regulatory processes and higher goal achievement (Burnette et al., 2013), lower fear of failure (Gouëdard, 2021) or better academic performance (Claro et al., 2016; Gouëdard, 2021).

While the main focus of mindset research has been on the effects of learners' mindsets (Dweck & Yeager, 2019), teachers' growth mindsets (i.e., teachers' beliefs

that students' abilities can be developed through effort and practice) might play an important role in enabling the positive effects of students' growth mindsets. Some authors (Murphy et al., 2021; Trzesniewski et al., 2021) have argued that growth-mindset classroom cultures cocreated by teachers' beliefs and practices represent an important moderator of the educational benefits of students' mindsets. In support of this claim, teachers' mindsets have been significantly associated with the mindsets of their students (Mesler et al., 2021), and interventions aimed at students' growth mindset have had a positive effect on students' academic achievement only in classrooms with teachers who also endorsed a growth mindset (Yeager et al., 2022). Furthermore, teachers with a growth mindset were more likely than other teachers to have students with higher achievement and motivation (Gouëdard, 2021). In line with our current research, recent studies (Lüftenegger & Muth, 2024; Shoshani, 2021; Stewart, 2018; Zeng et al., 2019) have also suggested that teachers' growth mindsets might be positively related to not only student educational outcomes but also teachers' perceptions of their work, including self-efficacy and occupational well-being.

However, despite its possible importance, research on the association between teachers' mindsets and work experiences has been scarce, although some preliminary evidence exists of a positive relationship between teachers' growth mindset and occupational well-being. Most notably, Shoshani (2021) explored the effects of a growth mindset intervention in math teachers that consisted of a series of workshops focusing on different themes from the mindset research. The intervention supported the development of a growth mindset in teachers from the experimental group, which was related to lower student dropout and higher enrolment of new students. Furthermore, the intervention increased teachers' well-being, self-efficacy and sense of meaning at work. A structural equation model showed that teachers' growth mindset was significantly related to their professional well-being (conceptualized as teaching satisfaction, positive and negative emotions, self-efficacy, and meaning at work), which was positively related to students' math performance. The authors argue that one of the mechanisms governing the effects of teachers' growth mindset on professional well-being was increased resilience, which helped teachers overcome challenges even when working with difficult students (Shoshani, 2021).

In another study, Zeng et al. (2019) found that teachers' growth mindset as a cognitive belief about the malleability of student abilities was related to teachers' work engagement (i.e., a positive emotional work-related state characterized by vigor, dedication, and absorption) both directly and through their increased well-being and perseverance of effort. As the constructs of work engagement and meaningful work are closely related (Keating & Heslin, 2015), we may expect that similar processes could be in play between a growth mindset and meaningful work. Overall, a growth mindset may provide teachers with a cognitive framework that allows interpreting student outcomes as controllable and, in turn, allows them to perceive themselves as more efficacious, perceive their work as teachers more positively and be more persistent when encountering difficulties.

Teachers' self-efficacy, or "teachers' self-referent judgments of capability" (Zee & Koomen, 2016, p. 981), is considered another essential cognitive characteristic of successful teachers (Schleicher, 2011) and has been extensively researched as an important factor underlying effective teaching and learning (Klassen & Tze, 2014; Zee & Koomen, 2016). Overall, teachers' self-efficacy has been related to the quality of the classroom processes and, in the next step, students' academic adjustment as well as teachers' well-being (Zee & Koomen, 2016). Teachers with higher self-efficacy were more willing than other teachers to experiment with new methods to respond to

students' needs (Ghaith & Yaghi, 1997) and provided higher-quality instruction, including cognitive activation, classroom management, and individual learning support of students (Holzberger et al., 2013). Furthermore, teachers' self-efficacy was related to teachers' job satisfaction (Klassen & Chiu, 2010), engagement (Chesnut & Burley, 2015), and lower incidence of burnout (Brouwers & Tomic, 2000; Chwalisz et al., 1992). Teachers' self-efficacy may be related simultaneously to student and teacher outcomes (Perera & John, 2020) and mediates the effects of the school environment on teachers' job satisfaction (Skaalvik & Skaalvik, 2010).

In terms of work-related outcomes, we presume that teachers with a growth mindset and a higher level of self-efficacy may perceive their work as more meaningful than other teachers because they are in a better position to expect and actually experience a more significant impact of their teaching on students' learning development. Meaningful work, i.e., "work experienced as particularly significant and holding more positive meaning for individuals" (Rosso et al., 2010, p. 95), has been related to numerous work outcomes, including work engagement (Guo & Hou, 2022), job performance (Frieder et al., 2018), psychological well-being (Cassar & Buttigieg, 2013), and others (Allan et al., 2019; Rosso et al., 2010). For teachers, the perceived meaningfulness of teaching has been related to positive relationships with students and higher job satisfaction or sense of happiness (Fourie & Deacon, 2015; Lavy & Bocker, 2018) and constitutes a personal resource that buffers the negative impact of stressful work conditions (Minkkinen et al., 2020).

In general, meaningful work stems from three main attributes: the significance of work (i.e., the work is perceived as important and valuable), broader purpose of work (i.e., the work transcends self-interest and contributes to a greater good), and self-realization (i.e., the work is authentic, allows expression of self, and enables the actualization of one's potential) (Martela & Pessi, 2018; Martela & Riekki, 2018). In the context of teaching, qualitative studies have shown that teachers have found an important source of meaningfulness in the transfer of knowledge and making positive relationships with students, or developing their teaching competence (Fourie & Deacon, 2015; Turner & Thielking, 2019). Even when faced with challenging conditions related to teaching difficult students, teachers derived meaning from their work by developing their sense of agency and authenticity through their perceived contributions to a greater good or a sense of belongingness and social identification with their students and colleagues (Brunzell et al., 2018).

Aim of the Study: Teachers' Growth Mindset, Self-efficacy, and Meaningful Work

Based on the review above, we expect that a growth mindset and self-efficacy provide teachers with sense-making frameworks that frame students' learning development as more responsive to teachers' actions and facilitate teachers' sense of agency. The difference between both concepts is that teachers' mindsets anchor the possible change-ability of students' development in students, while teachers' self-efficacy involves teachers themselves. Nevertheless, both sets of beliefs allow for positive interpretations of teachers' teaching experiences, support their higher expectations of students, and enable implementing more effective teaching practices. In this way, teachers may perceive themselves as having a more significant impact on students' lives, which is a key attribute of meaningful work as teachers.

Furthermore, we argue that the relationship between teachers' growth mindsets, teachers' self-efficacy and the perceived meaningfulness of teaching may be hierar-

chical, with teachers' self-efficacy as the mediating variable. As teachers' self-efficacy comprises the ways in which teachers judge their own teaching capabilities (Zee & Koomen, 2016, p. 981), teachers with a growth mindset may perceive themselves as more capable of making positive changes in students' learning. This may facilitate a more proactive approach by teachers toward students, greater resilience and more persistence in working with a variety of students, even when encountering difficulties, which may further enhance their self-efficacy. In this way, teachers' growth mindset may be part of a belief system directly related to teachers' self-efficacy (Lüftenegger & Muth, 2024; Shosani, 2021).

Based on these arguments, we formulated the following hypotheses of the relationships among teachers' growth mindset, self-efficacy and perceived meaningfulness of teaching that we tested in the structural equation modeling (SEM) framework:

H1: A growth mindset in teachers is positively related to their perceived meaningfulness of teaching.

H2: Teachers' self-efficacy is positively related to the perceived meaningfulness of teaching.

H3: A growth mindset in teachers is positively related to teachers' self-efficacy.

H4: A growth mindset in teachers is positively related to the perceived meaningfulness of teaching through self-efficacy.

MATERIALS AND METHODS

Design of the Study

To test the hypothesized relationships among teachers' mindset, self-efficacy and perceived meaningfulness of teaching, we analyzed data from two large-scale questionnaire studies conducted on Czech teachers. These studies were conducted separately; the decisions regarding the methodology were made by different research teams, and the studies partially differed in their aims and instruments used, especially in the measures of teachers' self-efficacy (see further). However, we analyze the data from both studies in one theoretical and analytical framework, as they both aimed to assess the effects of teachers' motivational beliefs (i.e., teachers' mindset and self-efficacy) on work-related outcomes, including the perceived meaningfulness of teaching. We believe that, although the results of both studies are not directly comparable, they may have valuable insights into how teachers' mindsets and self-efficacy relate to their perceived meaningfulness of teaching.

Study 1

The first study included a sample of early career Czech teachers who participated in a national survey of teacher graduates and novice teachers conducted by the Ministry of Education, Youth and Sports of the Czech Republic (MEYS), which was the first national survey of this kind. The survey focused on how novice teachers perceived their competences in various areas, such as teaching planning, teaching strategies, classroom management, assessments, evaluations, and collaboration with others. To assess the experiences of novice teachers in a broader context, the questionnaire included other scales focusing on work characteristics and attitudes toward teaching.

The data collection was conducted according to the ethical standards of the MEYS and without an involvement of the authors of the study. The authors collaborated with MEYS in the preparation of the survey and were provided with the anonymized data for secondary analyses. In this study, we only worked with data from novice teachers; therefore, we described the data collection related to this subsample. The questionnaire was distributed among novice teachers through school principals who were contacted by the MEYS via data mailboxes. Principals of Czech elementary and high schools that reported employing at least one novice teacher in the 2021/2022 and 2020/2021 school years were contacted. Novice teachers were identified by MEYS as those in the first two years in the profession; however, the school principals often included teachers in their third year, which we retained in the dataset as we did not intend to focus primarily on novice teachers. Principals were asked to forward to novice teachers in their schools a document with an anonymized link to the online questionnaire and a request to complete it. Principals were contacted in late May/ early June 2022. A total of 1620 novice teachers completed the questionnaire; after excluding participants with missing values (n=47) and outliers (n=126), we retained a sample of 1447 participants. A z-score analysis was conducted to detect potential outliers in the variables used in the analysis; cases with z-scores beyond ± 3 were considered outliers.

Study 2

The second study included a representative sample of Czech elementary school teachers who participated in the first wave of the longitudinal study "Panel 150" that explored psychosocial environments at Czech elementary schools and their effects on pupils' educational outcomes from perspectives of different actors, including pupils, teachers and school principals. The authors of the study prepared the questionnaire battery and the data were collected by an external organization (The Public Opinion Research Centre, Institute of Sociology, Czech Academy of Sciences). The data were collected by stratified randomized sampling using CAWI method; the sample was stratified to be representative of the regions of the Czech Republic and the school size. After a liaison with school principals of the selected schools, all teachers teaching Grades 6-9 (i.e., middle elementary school teachers in the Czech context) were approached with the online questionnaire. The total sample participating in Study 2 included 1768 participants and we retained the full sample in our analysis as we identified no missing values or outliers. Study 2 was approved by the Ethical committee of the Institute of Sociology, Czech Academy of Sciences (Ethical consent no. SOU-273/2023). The data collection for Study 2 took place between April and June 2023.

Sample

As explained above, the sample included in our analysis consisted of 1447 novice elementary and high school teachers who participated in Study 1 and of 1768 second-level elementary school teachers who participated in Study 2. The descriptive statistics of the participants included in both studies are provided in Table 1.

Methods

Based on our hypotheses, we included the following items as measurement variables.

As demographic variables, we included in both studies the gender and age of participating teachers and the length of their teaching experience after graduation. In Study 1, the age and the length of teaching experience were measured directly in years; in Study 2, the participants were asked to place themselves in one of the predefined categories as shown in Table 1.

As a measure of teachers' mindset in both studies, we adapted four items of the Dweck mindset instrument (Dweck, 2017) to reflect the context of teachers' beliefs about the nature of the cognitive abilities of their students. The participants assessed on a six-point scale ranging from 1 -"Strongly agree" to 6 -"Strongly disagree" their beliefs about the stability or malleability of the cognitive abilities of their students

Variable	Category	n	%
	Study 1 (n=1447)		
Gender	Female	1034	71.5
	Male	413	28.5
Years in practice after graduation	1 year	743	51.4
	2 years	482	33.3
	3 years	222	15.3
School level*	Lower elementary	535	37.0
	Middle elementary	696	48.1
	High school	513	35.5
Mean age	32.47 years (sd= 9.19)		
:	Study 2 (n=1768)		
Gender	Female	1307	73.9
	Male	448	25.3
	Other	13	0.8
Years in practice after graduation	Less than 1 year	55	3.1
	1-5 years	385	21.8
	6-10 years	230	13.0
	1 – 15 years	202	11.4
	16 – 20 years	249	14.1
	21 – 25 years	217	12.3
	26 - 30 years	146	8.2
	More than 30 years	284	16.1
Age	Up to 25 years of age	34	1.9
	25 – 29 years of age	150	8.5
	30 - 39 years of age	378	21.4
	40 – 49 years of age	595	33.6
	50 – 59 years of age	419	23.7
	60 – 69 years of age	180	10.2
	Over 69 years of age	12	0.7

Table 1 Descriptive statistics of the research samples

* Some teachers were teaching simultaneously at different levels

(e.g., "Teachers can teach pupils new things, but they can't truly change their basic intelligence."). The responses were recoded such that a higher value on the response scale signifies higher endorsement of the growth mindset. The instrument showed good reliability in both studies (Cronbach's alpha in Study 1 =.75, in Study 2 =.79). Considering that we used an adapted version of the Dweck mindset instrument, we conducted a confirmation factor analysis based on data pooled from both studies. The analysis showed a good fit of the model (CFI=.983; TLI=.949; RMSEA=.087; SRMR=.048).

As a measure of teachers' self-efficacy, we included in the first study a 32-item scale, which was constructed by a panel of experts at MEYS on the basis of the Teacher Professional Qualities Framework (Tomková et al., 2012). This instrument's overall intent was to measure how novice teachers perceive their capabilities in all relevant areas outlined by the framework, reflecting the task specificity of self-efficacy beliefs (Bandura, 1997). In this way, the instrument included six domains of teachers' self-efficacy based on this framework. The participants assessed themselves on a 7-point scale ranging from 1 -"I definitely cannot" to 7 -"I definitely can" in the key professional qualities, including instructional planning (4 items, e.g., "I believe I can set goals of the teaching lesson in a way that supports the development of pupils' competencies."), learning processes (6 items, e.g., "I believe I can explain to the pupils an importance of the curriculum content."), learning environment (6 items, e.g., "I believe I can set rules of classroom behavior."), assessment (5 items, e.g., "I believe I can provide feedback to the pupils, so they can improve."), reflection on teaching (4 items, e.g., "I believe I can evaluate whether the goals for the lecture were met.") and school development and collaboration (6 items, e.g., "I believe I can prepare the teaching in collaboration with my colleagues."). The scales showed excellent reliability in our study (Cronbach's alpha =.96). To more thoroughly assess the psychometric properties of the instrument, we also conducted a confirmation factor analysis, which tested the proposed six dimensions of the questionnaire. The analysis showed a good fit of the model (CFI=.931; TLI=.924; RMSEA=.051; SRMR=.033).

In the second study, we included the Teachers' Sense of Self-Efficacy Scale (TSES, Klassen et al., 2009) as a measure of teachers' self-efficacy. This 12-item scale measures teachers' self-efficacy in three broad dimensions, including instructional strategies, student engagement, and classroom management. In TSES, the respondents assess on a 9-points scale their belief that they can successfully perform relevant teaching practices, such as "How much can you do to craft good questions for students" (Instructional strategies), "How much can you do to help students value learning?" (Student engagement), or "How much can you do to get children to follow classroom rules?" (Classroom management). The response scale ranges from 1 - "Nothing" to 9 - "A great deal"). The TSES scale showed excellent reliability in our study (Cronbach's alpha = .92).

As a measure of the meaningfulness of teaching in both studies, we adapted the "Meaning of Work" scale from the Copenhagen Psychosocial Questionnaire III (Burr et al., 2019), which consisted of two items ("Is your work as a teacher meaningful?" and "Do you feel that your work as a teacher is important?") to which participants responded on a 5-point scale ranging from 1 - "To a very large extent" to 5 - "To a very small extent"). In the analysis, we recoded the response scale so that the higher number reflected a higher level of perceived meaningfulness of teaching. This measure showed good reliability in both studies (Spearman-Brown coefficient in Study 1 = .74, and in Study 2 = .80).

Analysis

We computed descriptive statistics for all included variables in SPSS (Version 23 for Windows; IBM, Armonk, NY, USA). While the skewness and kurtosis of the variables were within an acceptable range, the Kolmogorov–Smirnov test showed that the variables were not normally distributed (see Table 2). To address the non-normality in the data, we used standard nonparametric bootstrapping with 1,000 resamples to obtain confidence intervals for path coefficients in the SEM.

In the next step, based on our hypotheses introduced in the "Aims of the study" section, we formulated two unmediated and two mediated models that we tested within a SEM framework using the lavaan package in R (Rosseel, 2012) and estimated with the maximum likelihood method. In the unmediated models, we hypothesized that teachers' mindset and teachers' self-efficacy were directly related to the perceived meaningfulness of teaching. In the mediated models, we hypothesized that teachers' mindset was directly related to the perceived meaningfulness of teaching and to teachers' self-efficacy, which, in the next step, was also associated with the perceived meaningfulness of teaching. We controlled for the effects of gender, age, and years of practice by including their effects on all latent variables. In the measure of teacher self-efficacy in Study 1, we collapsed all items related to particular competences into parcels (i.e., aggregate-level indicators comprised of the average of two or more items) computed as the mean score to reduce the sampling variability of the selected sample and the amount of incorrectness of the model (Little, 2013). Similarly, in Study 2, we collapsed all items related to the TSES subscales into parcels representing instructional strategies, student engagement, and classroom management subscales.

We used the a priori sample size calculator for SEM (Soper, 2019) to determine whether the sample size was appropriate for our analyses. Based on the number of latent and observed variables included in the models, a statistical power level of .8, and an anticipated effect size of .1, the recommended minimum sample size was 1258 participants. When we lowered the anticipated effect size, the recommended number of participants was higher than that of our current samples. Therefore, we report the results only at the 1% significance level and interpret only the effects higher than .1. All reported coefficients from our analyses were standardized. We assessed the model fit using standard measures, including the chi square statistic and corresponding p value; the root mean square error of approximation (RMSEA, with values of approximately .05 or less being indicative of a close fit, and values of .08 or less being indicative of a good fit) (MacCallum et al., 1996); the standardized root mean square residual (SRMR, which should approximate or be less than .08 for a good-fitting model) (Hu & Bentler, 1999); and the comparative fit index (CFI, where values should be higher than .90 for adequately fitting models) (Marsh et al., 2004). The data used in the analyses are available upon request.

RESULTS

The descriptive statistics of the variables used in the analysis are provided in Table 2. In the SEM analysis, we tested the unmediated and mediated models for both studies and determined that the models fit well with the data. The fit indices, regression coefficients and variances explained in the mediation models are provided in Tables 3 and Table 4.

				Study 1							Study 2		
		н	sd	Skewness	Kurtosis	Kolmogorov-Sr	nirnov (p)	Е	ps	Skewness	Kurtosis	Kolmoge	rov-Smirnov (p)
Growth mindset		3.96	.83	.120	.127	.078 (<.0	01)	3.63	.80	016	.527	80.	39 (<.001)
Teachers' self-effic	cacy	5.36	.83	649	1.509	.035 (<.0	01)	6.80	1.01	610	.636	0.	50 (<.001)
Meaningfulness of	teaching	4.57	.52	.704	941	.338 (<.0	01)	4.38	.63	924	1.121	.2	38 (<.001)
	Table	3 Effec	ots of	teachers' m	indset and	self-efficacy on	perceived	meani	ıgfulne	sss of teach	ning – Stuc	dy 1	
	Model 1	– unn	nediat	pe			Model 2 -	- media	ted				
	Meaning	gfulnes	ss of to	eaching			Teachers'	self-eff	icacy	Meaningfi	ulness of te	eaching	
Predictor variable	Standard	dized e	stima	te [CI]			Standardi estimate [zed CI]		Path			Standardized estimate [CI]
Teachers' growth mindset	.124 [.05	55197	[7				.113 [.053	119]		Direct			.122 [.056191]
										Indirect th self-efficae	rough Tea cy	cher's	.024 [.010042]
										Total			.145 [.082217]
Teachers' self- efficacy	.214 [13	6-289]											.210 [.132284]
R ²	.061						.049			.065			
Fit indices	$\chi^2 = 976$ CI [.051 AIC = 3. BIC = 3.	50.019; to .06 5474.5 5722.5	; df = 1]; SF 578 44	102; p < .0(MR=.042;	01; RMSF CFI = .96	.A = .056; 90% 3, TLI=.952;	$\chi 2 = 9760$.060]; SR BIC = 35'	.019; d MR=.0 716.538	f = 102 35; CF	2; p < .001 I = .964, T	; RMSEA 'LI=.953; ^{<i>i</i>}	= .055; 9 AIC = 35	0% CI [.050 to 463.296

Note. All coefficients are significant at the 1% level.

Table 2 Descriptive statistics

	Model 1 – unmediated	Model 2 – mediated		
	Meaningfulness of teaching	Teachers' self-efficacy	Meaningfulness of teaching	
Predictor variable	Standardized estimate	Standardized estimate	Path	Standardized estimate
Teachers' growth mindset	.116 [.067192]	.189 [.134259]	Direct	.101 [.053171]
			Indirect through Teacher's self-efficacy	.081 [.057127]
			Total	.182 [.137271]
Teachers' self-efficacy	.434 [.385545]			.429 [.378534]
R2	.189	.109	.198	
Fit indices	χ ² = 5880.732; df = 63; p < .001; RMSEA = .066; 90% CT [.060 to .072]; SRMR=.048; CFI = .944, TLI=.918; AIC = 38192.355 BIC = 38400.244	χ2 = 5880.732; df = 63; p < SRMR=.032; CFI = .952, TL BIC = 38361.812	.001; RMSEA = .062; 90% CI J=.927; AIC = 38148.473	I [.056 to .068];
Note. All coefficie	onts are significant at the 1% level.			

Table 4 Effects of teachers' mindset and self-efficacy on perceived meaningfulness of teaching – Study 2

The measurement loadings for all latent variables were moderately high to high (range: .60-.90) and highly significant (p <.001). We present the mediation models for Study 1 and Study 2 including all hypothesized relationships in Figure 1 and Figure 2. In both models, the teachers' self-efficacy was positively associated with perceived meaningfulness of teaching, with a higher effect observed in Study 2 (β =.21 in Study 1 and .43 in Study 2). Furthermore, growth mindset was positively associated with teachers' self-efficacy (β =.11 in Study 1 and .19 in Study 2) and both directly (β =.12 in Study 1 and .10 in Study 2) and indirectly (β =.02 in Study 1 and .08 in Study 2) associated with perceived meaningfulness of teaching. Regarding the included demographic variables, in Study 1 only age had a significant effect on teachers' self-efficacy (β =.18); in Study 2, age had a positive effect on teachers' self-efficacy (β =.27) and negative effect on perceived meaningfulness of teaching (β =.-12). The model explained 6.1% of the variance in the perceived meaningfulness of teaching in Study 1 and 19.8% in Study 2.



Figure 1 SEM model - Study 1





In conclusion, models in both studies fit our data, which supports our hypotheses that the mindset and self-efficacy of teachers are directly related to the perceived meaningfulness of teaching. We also observed the hypothesized partial mediation effect of teachers' self-efficacy in the relationship between teachers' growth mindset and perceived meaningfulness of teaching; however, because the effect, albeit significant, was weak, we need to discuss its practical applicability. It appears that the hypothesized effects were stronger and the variance explained was higher in Study 2, which suggest a higher relevance of the hypothesized model for the general population of teachers than for novice teachers included in Study 1.

DISCUSSION

The structural equation models that we formulated based on the mindset framework (Dweck, 2017; DeLuca et al., 2019; Mesler et al., 2021; Seaton, 2018; Yeager et al., 2022) as well as research on teachers' self-efficacy (Klassen & Tze, 2014; Zee & Koomen, 2016) and meaningful work (Martela & Pessi, 2018; Martela & Riekki, 2018) fit well with our data and largely confirmed our hypotheses regarding the relationships among teachers' mindset, self-efficacy and perceived meaningfulness of teaching, with support for the direct relationships and partial support for the mediation effect of teachers' self-efficacy. While the models explained a relatively small portion of the variance in the perceived meaningfulness of teaching, we argue, in line with Yeager and Dweck (2020), that even the small effects of a growth mindset are meaningful and should be considered useful in real-world contexts in which teachers' (e.g., Dicke et al., 2018; Hakanen et al., 2006; Skaalvik & Skaalvik, 2010; Turner & Thielking, 2019).

Our findings contribute in several ways to the knowledge about teachers' meaning system, including mindset and self-efficacy (Lüftenegger & Muth, 2024), and its possible effects. First, in the models, teachers' growth mindset and self-efficacy were directly related to the perceived meaningfulness of teaching. We argue that when teachers endorse a belief that student abilities are malleable qualities or perceive themselves as capable of high-quality teaching, it relates to the key dimensions of meaningful work (Fourie & Deacon, 2015; Martela & Pessi, 2018; Martela & Riekki, 2018). Within such a meaning system (Lüftenegger & Muth, 2024), a positive change in student outcomes may be more attributable to teachers' actions and teachers may experience their teaching as positively contributing to student lives and, in this way, as more significant, beneficial, and having a broader purpose (Brunzell et al., 2018; Fourie & Deacon, 2015). As teachers generally find meaning in their involvement in transferring knowledge to students (Fourie & Deacon, 2015), believing that such a transfer is possible in all students and that teachers themselves are capable of facilitating this process may add to their sense of meaningfulness of teaching.

Furthermore, teachers' growth mindset about student abilities may be related to their other positive attributes that support the sense of meaningfulness, such as better relationships even with lower achieving students or a more positive view of the possible development of their teaching competence (Turner & Thielking, 2019). In addition, teachers' growth mindset may actually enhance students' motivation and learning (Gouëdard, 2021; Yeager et al., 2022), which may also contribute to teachers' perception of their work as significant and meaningful. Nevertheless, compared to teachers' mindset, we observed stronger effects of teachers' self-efficacy in relation to perceived meaningfulness of teaching, supporting the findings of many other studies that teachers' positive perceptions of their teaching capabilities relate to more effective teaching practices, as well as positive student and teacher outcomes (Klassen & Tze, 2014; Perera & John, 2020; Zee & Koomen, 2016), which all may translate into an increased sense of agency, an important attribute of meaningful work (Brunzell et al., 2018; Martela & Pessi, 2018).

Our results also suggest that a positive perception of teachers' competencies may be somewhat enhanced by perceiving student abilities as malleable. Along with other studies (Lüftenegger & Muth, 2024), we argue that teachers' growth mindset may be approached as part of a meaning system that precedes self-efficacy, as it subjectively grounds students' outcomes in physical reality outside the reach of teachers' actions. According to this perspective, teachers' growth mindset forms a context in which there is a possibility that teachers' actions can have a significant positive impact on all students (Turner & Thielking, 2019). In other words, perceived meaningfulness may partially stem from teachers' sense that positive change in all students is possible (i.e., teachers' growth mindset) and, thus, they are capable of having a positive impact on students (i.e., teachers' self-efficacy).

To consider the practical implications of our results, we may argue that teachers' growth mindset should be a focus in teachers' education (e.g., Keesey et al., 2018; Rissanen et al., 2019; Shosani, 2021), as it may be related to not only student outcomes but also positive teacher outcomes, including self-efficacy and a sense of meaningfulness of their work. While the effects of the growth mindset in our models were small, when we consider the possible multitude of variables that may contribute to how teachers experience their work, our results still suggest that the growth mindset has practical value. Our results suggest that the positive effects of teachers' growth mindset may be higher in the general population of teachers (as represented in Study 2) than in novice teachers (as represented in Study 1). A greater emphasis on the development of a growth mindset during teachers' education, and even more so in experienced teachers, could produce a positive change in their beliefs about students and subsequently in their teaching experience. As found by other studies, the effectiveness of short-term growth-mindset interventions aimed at teachers is limited (Yeager & Dweck, 2020), and longer, more intensive educational programs are necessary to produce a lasting change (Shoshani, 2021). The inclusion of mindset-related education not only during teachers' formative years but also later in their careers could contribute to their sense of efficacy and also positively affect their experience of their work.

When discussing the results of our analysis, we need to consider the limitations of the study and our analytical approach. The data collection in both studies provided us with a large datasets that were sufficient for the conducted SEM analyses. However, our data were cross-sectional, which limits the possibilities of causal interpretations of the observed relationships. We hypothesized relationships among teachers' mindset, self-efficacy and perceived meaningfulness of teaching and, based on theories of mindset, teachers' self-efficacy, and meaningful work, we expected that the suggested direction of these relationships are at least partially valid. At the same time, it is necessary to acknowledge that in reality, these relationships are more complex than suggested in our models, and we must interpret the results of our analysis with caution. As the data collection in Study 1 was relatively restricted by the focus on teachers' perceived competences, we were limited by the variables included in the study. A broader approach could produce a more comprehensive model providing a better explanation of the sense of meaningfulness and other teachers' outcomes. Our models explained a relatively small portion of the variance in the perceived meaningfulness of teaching, so we may expect that other variables not included in the analysis, such as teachers' perceptions of the workplace environment, including job resources and demands, play

a greater role in explaining the variance in this variable and that the effects of teachers' mindset should not be overestimated.

Considering these limitations, the present article suggests some venues for further research. First, the effects of the growth mindset have usually been considered in relation to student outcomes (Dweck & Yeager, 2019). Our results suggest that the positive effects of a growth mindset could also extend to how teachers perceive their work, and future studies should explore this topic. From this perspective, teachers' mindset could be approached as a personal resource and be incorporated into models of the occupational health of teachers (e.g., Dicke et al., 2018; Hakanen et al., 2006). Furthermore, as our study is only cross-sectional, future studies should implement research designs that allow for causal interpretations, such as intervention or longitudinal studies. Growth mindset interventions for teachers are relatively low cost and have proven to be beneficial in relation to student outcomes (Yeager & Dweck, 2020) and teachers' self-efficacy (Shoshani, 2021). It would be useful to explore further the efficiency of such interventions in relation to the occupational health of teachers. We intend to explore some of these venues in a follow-up to Study 2, in which the second wave of data collection took place in 2024.

CONCLUSIONS

In the present article, we used two large questionnaire datasets collected on different populations of Czech teachers and tested assumptions stemming from a social-cognitive perspective, which presupposed that teachers' growth mindset and self-efficacy represent positive sense-making frameworks that facilitate the perceived meaningfulness of teaching. We tested structural equation models in which teachers' growth mindset and self-efficacy showed direct effects on the perceived meaningfulness of teaching, while the effect of teachers' growth mindset was also partially mediated by teachers' self-efficacy. These findings suggest that the effects of teachers' growth mindset, while small, may be beneficial for a positive experience of teachers' work, which opens a venue for future mindset research in the area of teachers' occupational health, including intervention and longitudinal studies.

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