

## The Role of Teaching Experience and Prior Education in Teachers' Self-Efficacy and General Pedagogical Knowledge at the Onset of Teacher Education

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**Abstract.** This study explored how teachers' general pedagogical knowledge (GPK) and teachers' self-efficacy (TSE) at the beginning of teacher education differ in terms of student teachers' individual characteristics. The study participants were 240 teachers in their first year of education who completed a questionnaire that assessed their GPK, three types of TSE, years of teaching experience, level of prior education and sex. The results indicate that prior education, sex and, to a lesser extent, teaching experience explain a significant portion of the GPK. Prior education, teaching experience and, to some extent, sex explain a significant portion of the three types of TSE. These results emphasize the importance of individual characteristics, particularly teaching experience and prior education, in understanding heterogeneity at the onset of teacher education in GPK and TSE, two central constructs that affect teachers' and students' outcomes.

**Keywords:** General Pedagogical Knowledge; Self-Efficacy; Teaching Experience; Prior Education.

### Introduction

Teachers' knowledge has been shown to be associated with higher quality instruction – which, in turn, has a positive effect on student learning (Hill, Ball, Blunk, Goffney, & Rowan, 2007; Wayne & Youngs, 2003). Teachers' knowledge is usually divided into three types: *content knowledge* (CK), which is knowledge about facts, concepts, subject terminology and the organization of subject-specific concepts; *pedagogical content knowledge* (PCK), which is knowledge of various ways of representing and formulating a subject to make it comprehensible to others; and *general pedagogical knowledge* (GPK) (Shulman, 1986), which is defined as “the knowledge needed to create and optimize teaching-learning situations across subjects, including declarative and

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procedural knowledge” (Voss, Kunter, & Baumert, 2011, p. 209). Researchers (König & Blömeke, 2010; Voss et al., 2011) have identified four generic dimensions of GPK: a) *instructional planning*, which includes knowledge about determining course goals and content, structuring the lesson process, and developing teaching methods and tools, among other aspects; b) *classroom management*, which concerns discipline issues (e.g., strategies to prevent and counteract disturbances), student motivation, and so on; c) *learners’ heterogeneity and teacher’s adaptivity*, which refers to the management of heterogeneous learning groups in the classroom, the use of a wide range of teaching methods and strategies of differentiation, and knowledge of learners’ differences and learning processes; and d) *assessment*, which relates to student assessment and evaluation criteria. The present study is part of a project investigating the impact of teacher education on teachers’ knowledge, beliefs, and practices in instructional planning and classroom management. Accordingly, the study considers only the knowledge related to these two teaching tasks.

GPK is typically acquired during teacher education. However, many individuals entering teacher education have already developed a certain level of pedagogical, psychological or general educational knowledge. This knowledge may be acquired during practical experience, such as teaching internships, substitute teaching experiences and/or the practice of teaching without certification. According to Jones and Vesilind (1996), experiences with students are a major source of change in teacher knowledge. For instance, unexpected student behavior may significantly influence changes in student teachers’ knowledge and beliefs during teacher education. In addition, Voss et al. (2011) found that student teachers with teaching experience had higher means on all sub-dimensions of their GPK tests than those with no teaching experience. This difference was most striking in the area of knowledge of classroom management. Another likely factor contributing to GPK development is prior education: That is, student teachers may have higher levels of GPK due to general knowledge and other educational inputs. For example, Voss et al. (2011) found a significant correlation between GPK and general cognitive ability. Since general cognitive ability is linked to educational background, prior education may relate to GPK. Although a number of beginning teachers start their teacher education with some teaching experience and an educational background, the importance of this background for GPK has rarely been investigated.

Another central concept in teacher education—and, more generally, in teaching—is teachers’ self-efficacy (TSE), which is defined as teachers’ “judgment of [their] capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated” (Tschannen-Moran & Woolfolk Hoy, 2001, p. 783). TSE is a meaningful construct because it is related to both student outcomes, such as student engagement and academic achievement, and teacher outcomes, such as the provision of support to students, burnout, and job satisfaction (Siwatu & Chesnut, 2015).

In a study conducted by Huberman (1992), teachers were asked to indicate the extent to which they had mastered different facets of teaching, such as “Feeling at the same level as more experienced colleagues” and “Feeling generally confident as an experienced teacher.” Huberman (1992) found that the more years of teaching experience teachers had, the higher their feelings of instructional mastery were. This concept is very close to TSE, since it relates to teachers’ perceived instructional effectiveness. Tschannen-Moran and Woolfolk Hoy (2007) found similar results: Career teachers (four or more years of experience) rated themselves significantly higher on overall self-efficacy than novice teachers (three or fewer years of experience). Klassen and Chiu (2010) observed a curvilinear relationship between TSE and teaching experience: TSE increased from 0 year of experience to approximately 23 years of experience and then dropped afterwards. According to a study by Wolters and Daugherty (2007), the relationship between TSE and teaching experience varies depending on the type of TSE considered. For example, the impact of teaching experience on TSE is stronger for classroom management (maintaining order, discipline, keeping students quiet) and instructional strategies (using various instructional and assessment strategies to meet all students’ needs) than for student engagement (motivating uninterested students, helping students understand the value of learning). In sum, prior research suggests that TSE is related to years of experience. However, to the best of our knowledge, no research has yet explored the relationship between TSE and teachers’ prior education; thus, there is no basis from which to draw hypotheses or assumptions.

In conclusion, there is only limited and unclear knowledge of the factors explaining differences in GPK and TSE at the onset of teacher education. However, this information is relevant for tailoring teacher education and for fostering the development of teachers’ knowledge and beliefs. Accordingly, the purpose of this study was to investigate how teaching experience and prior education may explain individual differences in GPK and TSE.

## Method

### Participants

Participants consisted of 248 teachers in their first year of teacher education in the French-speaking part of Switzerland. Among these, 8 reported more than 20 years of teaching experience; they were removed from the sample for being outliers. Thus, the final sample consisted of 240 teachers. Among these, 128 were preservice general secondary education teachers, and 112 were in-service vocational teachers (47.1% women, 51.2% men, 1.7% unknown; mean age = 36 yrs. 1 mo., *SD* = 9 yrs. 1 mo.). During their first weeks of teacher education, the participants filled out a survey that included the following measures.

### Measures

#### General pedagogical knowledge

GPK was measured using a French adaptation/translation of the short version of the *Pädagogisches Wissen* [Pedagogical knowledge] test (König & Blömeke, 2010). One section was dedicated to classroom management and included four

closed-ended questions (*causal attributions*, 4 items; *classroom discipline*, 8 items; *learning motivation*, 5 items; *empathy*, 6 items) and two open-ended questions (*How to motivate a student*; *How to prevent disturbances in the classroom*). The other section addressed instructional planning with one closed-ended question (*Bloom's taxonomy of learning objectives*; 8 items) and two open-ended questions (*How to analyze a lesson (after it takes place)*; *How to structure a lesson plan*). The questions about *discipline* and *empathy* were developed by the authors, while the others were translated directly from the German test. The items were scored according to the test coding rubrics developed by König and Blömeke (2010). The scores for the closed-ended questions were calculated as the sums of the correct items. For example, the question on *learning motivation* was: "Which situations involve intrinsic motivation, and which involve extrinsic motivation?" One point was given for each instance in which the respondent correctly chose "intrinsic motivation" or "extrinsic motivation" after each item (e.g., "extrinsic motivation" for the item "A student studies before a math test because he/she is expecting a reward if he/she gets a good grade"). Scores for the open-ended questions were higher if the respondent provided a greater variety of answers. For example, the question for *lesson analysis* was: "Imagine that you help a novice teacher who has just given his first lesson. He evaluates this first lesson with you. Which questions would you ask him in order to provide an evaluation that will enable him to better prepare his future lessons? Formulate ten questions." One point was given for each written question if it addressed one of twelve criteria (*prior knowledge*, *structure*, *time management*, and so on). Two (or more) questions assessing the same criterion were rewarded with one point. Inter-rater reliability was calculated for the four open-ended questions via two independent coders. Cohen's Kappa showed a relatively good consensus (*How to analyze a lesson*: number of units coded = 1263,  $k = .79$ , percentage of agreement = 81.7%; *How to structure a lesson plan*: number of units coded = 1456,  $k = .69$ , percentage of agreement = 80.1%; *How to motivate a student*: number of units coded = 456,  $k = .75$ , percentage of agreement = 80.4%; *How to prevent disturbances in the classroom*: number of units coded = 509,  $k = .67$ , percentage of agreement = 72%).

### **Teachers' self-efficacy beliefs**

A French adaptation/translation (Dumay & Galand, 2012) of the 12-item *Ohio State Teacher Efficacy Scale* (Tschannen-Moran & Woolfolk Hoy, 2001) was used. The scale assessed three types of TSE, each with four items: classroom management, student engagement, and instructional planning (developed for this study; e.g., "Considering my recent realizations, resources and opportunities as a teacher, I feel able to select content whose difficulty is adapted to the learner's level"). Participants rated each item on a six-point Likert scale (1 = completely disagree; 6 = completely agree).

### **Teaching experience**

The number of years of teaching at the time of the survey was reported (ranged from 0 to 18 years;  $M = 2$  yrs. 2 months;  $SD = 3$  yrs. 5 months).

### **Prior level of education**

Participants' highest diploma achieved was reported and coded into a 14-level scale from 1 (initial vocational education) to 14 (PhD) ( $M = 10.45$ ,  $SD = 2.91$ ), following the Swiss Federal Statistical Office classification.

### **Data analysis**

To investigate the effects of experience and prior level of education on GPK and TSE, structural equation modeling (SEM)<sup>2</sup> was used. Three models were tested: one for each form of GPK question (closed-ended and open-ended) and one for TSE. The predictors were teaching experience, prior education, and sex. No assumptions were made about the effect of sex; instead, it was included as a control variable. Since only 143 of the 240 participants provided answers to the open-ended questions, GPK questions were split into two models in order to use all of the available data. Note that the distinction between preservice general secondary education teachers and in-service vocational teachers was not included as a variable in the model because the differences between these two types of teachers are strongly reflected through teaching experience and prior education. For each model, zero-order correlations are presented first; then, the model itself is presented.

### **Results**

Preliminary analyses indicated that there is no significant correlation between GPK and TSE or between closed-ended and open-ended GPK questions.

#### **General pedagogical knowledge: closed-ended questions**

Table 1 shows the zero-order Pearson correlations between the individual characteristics variables and the closed-ended questions on GPK.

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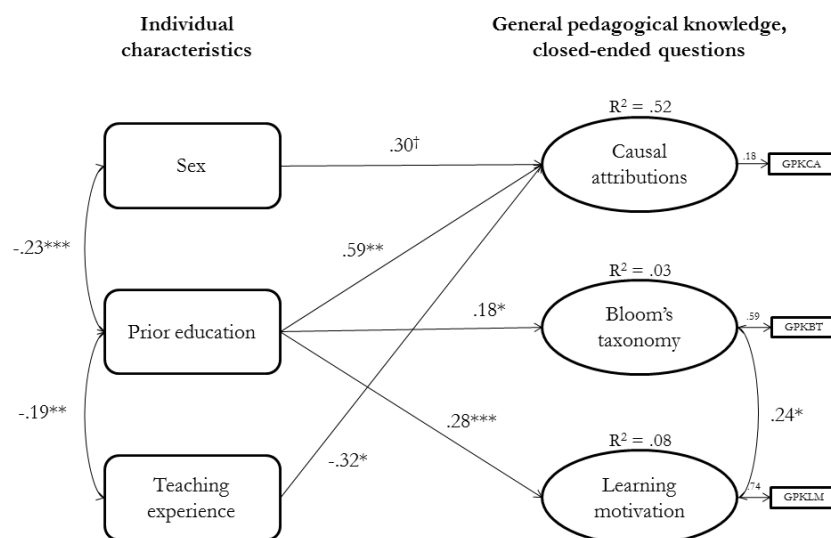
<sup>2</sup> The maximum likelihood robust estimator was used to include deviations from multivariate normality.

**Table 1: Zero-order correlations between individual characteristics variables and closed-ended questions on GPK**

Measure	1	2	3	4	5	6	7
<i>Closed-ended Questions on GPK</i>							
1. Teacher's empathy	–						
2. Causal attributions	-.16	–					
3. Learning motivation	.37	.28	–				
4. Discipline issues	-.17	.16	.12	–			
5. Bloom's taxonomy	.05	.22	.27	.24	–		
<i>Individual Characteristics</i>							
6. Teaching experience	.19	-.41	.05	-.06	.07	–	
7. Prior education	.05	.61	.28	-.01	.18	-.19	–
8. Sex	-.09	.16	.00	-.19	.07	.11	-.23

Note: N = 240. Sex is coded: 1 = female; 2 = male. Correlations with values between .13 and .17 are statistically significant at  $p < .05$ ; correlations with values between .17 and .21 are statistically significant at  $p < .01$ ; correlations with values of .21 and greater are statistically significant at  $p < .001$ .

The results of the SEM model are illustrated in Figure 1. The chi-square test of the model fit is not significant ( $\chi^2(4) = 5.493$ ,  $p = .24$ ), indicating a good fit. Only three of the closed-ended questions are related to individual characteristics. Issues of discipline and definition of empathy are not; thus, they are not shown in Figure 1.



**Figure 1: SEM results relating individual characteristics to closed-ended questions on GPK.**

Note: N = 240. GPK factors' indicators are the mean scores of the corresponding items. The reliability of GPK scores are integrated into the model using the formula  $(1-\alpha) \times \text{variance}$  (Bollen, 1989). Sex is coded: 1 = female; 2 = male. GPKCA = causal attributions item; GPKBT = Bloom's taxonomy item; GPKLM = learning motivation item. †  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

### General pedagogical knowledge: open-ended questions

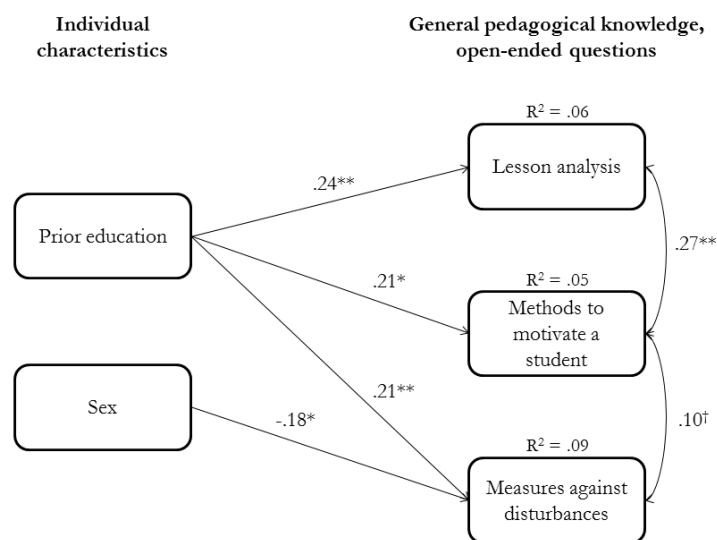
Table 2 shows the zero-order Pearson correlations between the individual characteristics and the open-ended questions on GPK.

**Table 2: Zero-order correlations between individual characteristics variables and open-ended questions on GPK**

Measure	1	2	3	4	5	6
<i>Open-ended Questions on GPK</i>						
1. Lesson plan	—					
2. Lesson analysis	.21	—				
3. Methods to motivate a student	.06	.24	—			
4. Measures against disturbances	.29	.14	.18	—		
<i>Individual Characteristics</i>						
5. Teaching experience	.02	-.01	-.04	-.02	—	
6. Prior education	.03	.23	.21	.25	-.13	—
7. Sex	-.03	-.03	-.02	-.22	-.02	-.19

Note: N = 143. Sex is coded: 1 = female; 2 = male. Correlations with values between .16 and .21 are statistically significant at  $p < .05$ ; correlations with values between .21 and .27 are statistically significant at  $p < .01$ ; correlations with values of .27 and greater are statistically significant at  $p < .001$ .

The SEM model is illustrated in Figure 2. The chi-square test of the model fit is not significant ( $\chi^2(2) = .075, p = .963$ ), indicating a good fit. Neither teaching experience nor lesson plans is related to any open-ended question; thus, neither is shown in Figure 2.



**Figure 2. SEM results relating individual characteristics to open-ended questions on GPK.**

Note: N = 143. Sex is coded: 1 = female; 2 = male. †  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ . The model did not converge at the estimation of the correlation between prior education and sex.

## Teachers' Self-Efficacy

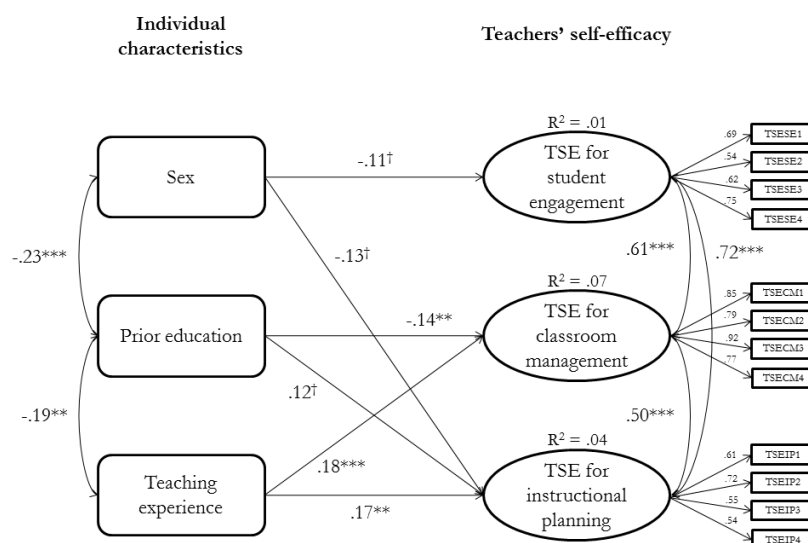
Table 3 shows the zero-order Pearson correlations between individual characteristics and TSE beliefs.

**Table 3: Zero-order correlations between individual characteristics variables and TSE beliefs**

Measure	1	2	3	4	5
<i>TSE Beliefs</i>					
1. TSE for classroom management	–				
2. TSE for student engagement	.59	–			
3. TSE for instructional planning	.47	.71	–		
<i>Individual Characteristics</i>					
4. Teaching experience	.25	.08	.19	–	
5. Prior education	-.17	.04	.10	-.19	–
6. Sex	.05	-.15	-.11	.10	-.23

Note: N = 240. Sex is coded: 1 = female; 2 = male. Correlations with values between .13 and .17 are statistically significant at  $p < .05$ ; correlations with values between .17 and .21 are statistically significant at  $p < .01$ ; correlations with values of .21 and greater are statistically significant at  $p < .001$ .

The SEM model is illustrated in Figure 3. The chi-square test of the model fit is significant ( $\chi^2(82) = 201.75, p < .001$ ). The fit indices are acceptable (CFI = .90, RMSEA = .08, SRMR = .06) following Schermelleh-Engel, Moosbrugger, and Müller (2003) guidelines.



**Figure 3. SEM results relating individual characteristics to TSE beliefs.**

Note: N = 240. Sex is coded: 1 = female; 2 = male. TSE = teachers' self-efficacy; TSESE = teachers' self-efficacy for student engagement; TSECM = teachers' self-efficacy for classroom management; TSEIP = teachers' self-efficacy for instructional planning. †  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .



## Discussion

Overall, individual characteristics were significantly linked to GPK and TSE, confirming that, combined, these characteristics explain individual differences among teachers as they enter teacher education.

According to our results, GPK depends mostly on prior education. This predictor significantly explains variance in all GPK questions except *knowledge of classroom discipline*, *knowledge of the definition of empathy* and *knowledge of lesson plan*. There are three possible reasons for this effect: First, GPK is partly acquired when studying other subjects. Second, respondents can rely on their reasoning abilities to answer the items assessing GPK. These first two explanations imply that GPK might not be fully specific to teaching. Moreover, in support of the second explanation, Voss et al. (2011) found a latent correlation of  $\varphi = .58$  between general reasoning abilities and a GPK test. In the present study, the level of prior education can be considered a proxy for general reasoning abilities. The third explanation is that people with higher levels of education are more used to providing written answers to open-ended questions, since they have often been requested to do so during their education.

The absence of a positive relationship between teaching experience and GPK is surprising, since this finding is not in line with prior research (Voss et al, 2011). In our study, teaching experience is only related –negatively– to knowledge of causal attributions. One could argue that causal attributions are associated to beliefs rather than knowledge. Teachers with greater teaching experience are more likely to have encountered situations that have strengthened their beliefs about causal attributions over time. The absence of a link between teaching experience and the other GPK questions might be explained by the difficulty to acquire formal knowledge about teaching and learning when one is only having classroom experience and limited opportunity for reflective thinking as offered during teacher education. In another finding that is difficult to interpret, we found that two GPK questions were explained by sex: Specifically, male teachers had higher scores on causal attribution, while female teachers had higher scores related to knowledge of measures against disturbances.

Individual characteristics did explain individual differences in TSE, but only to a certain extent (i.e., up to 7% of explained variance). Prior education was found to be negatively related to TSE for classroom management. A possible explanation is that those with the highest education feel confident in their content knowledge, but worry about managing students' behavior. Moreover, prior education was found to be positively related to TSE for instructional planning; our interpretation is that teachers with higher levels of education are likely to have learned to plan and structure their work as students.

Women reported higher TSE for student engagement and instructional planning than men. This finding contrasts with prior studies indicating that men have higher TSE (Klassen & Chiu, 2010). Finally, the results reveal that two types of TSE depend on teaching experience: TSE for classroom management and TSE for instructional planning. This could mean that teachers can develop self-confidence in managing classroom discipline and preparing lessons by

experiencing teaching without certification. However, teaching experience was not found to be related to TSE for student engagement, indicating that teachers need formal education in order to know how to engage students in learning and to feel confident in doing so.

These results suffer from several limits. First, the range of GPK considered is restricted (i.e., it does not include information on learners' heterogeneity, teacher's adaptivity, and knowledge of assessment; König & Blömeke, 2010; Voss et al., 2011). Second, for the open-ended GPK questions, the coding rubrics use the variety of answers as a criterion for providing a knowledge score. This approach offers a limited perspective on teacher knowledge by neglecting other aspects of knowledge, such as its adequacy for a given situation. Finally, the sample size is limited for the model related to open-ended GPK questions and might not be fully comparable to the full sample. Thus, the results of this study should be replicated in other samples and using other GPK and TSE measures.

In conclusion, the study results emphasize the importance of considering individual characteristics, particularly teaching experience and prior education, in order to understand heterogeneity at the onset of teacher education in GPK and TSE, two central constructs affecting teachers' and students' outcomes. Moreover, individual differences among teachers must be considered when developing GPK during teacher education. While some teachers might think that they already acquired GPK in practicing teaching, our results indicated that this is not the case. Thus, it seems important to explain them the relevance of courses about learning and teaching. Teachers with a high level of education might more easily acquire and apply GPK; further research is however needed to examine this assumption. It is also essential to consider individual differences when fostering TSE during teacher education: Male and women teachers are not equals in terms of feeling confident about teaching tasks, and teachers with a high level of education worry more about their ability to manage classrooms. The take-away message from this article is that individual differences have to be taken into account in teacher education.

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