

Section 4: Comparative Research on Teachers and Their Work Contexts
Chapter 2

Effects of Job Motives, Teacher Knowledge and School Context on Beginning Teachers'

Commitment to Stay in the Profession:

A Longitudinal Study in Germany, Taiwan and the United States

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Abstract

This three-year longitudinal study examines which teacher and school characteristics contribute to teachers' commitment to stay in the profession. 3,000 beginning teachers from Germany, Taiwan and the USA were assessed at the end of teacher education and three years later. Multiple-group path analyses revealed that at the end of teacher education, job motives, mathematics content knowledge and teachers' sense of preparedness significantly predicted their commitment. The relational patterns varied between countries. Similarly, the development of teachers' commitment was significantly but with varying strengths across countries affected by job satisfaction, the perceived job burden and school quality. Policy makers need to be careful with generalizing results from one country to another.

Keywords

Beginning teachers, comparative study, mathematics content knowledge, teacher education, job satisfaction, teacher appraisal, principle leadership

Introduction

The induction period is a sensitive period in a teacher's life (Paine, Pimm, Britton, Raizen & Wilson, 2003). These beginning years in the profession are regarded as being decisive for long-term commitment to the job (Feiman-Nemser & Parker, 1993; Veenman, 1984). Beginning teachers have to cope with an overwhelming amount of work; applying the knowledge gained during teacher education to different and complex classroom situations with multidimensional challenges occurring at high speed (Sabers, Cushing & Berliner, 1991). Veenman stated in 1984 that beginning teachers experience a "shock" being confronted with classroom reality resulting in a decreased sense of self-efficacy and lower commitment to stay in the profession which in turn lead to high attrition rates.

In fact, many countries report high attrition rates during the first few years in the teaching profession (Ingersoll, 2003; OECD, 2005). Although this is a costly problem, knowledge about factors that would change teachers' commitment to stay in the profession in various national contexts is scarce. It is therefore difficult to design educational policy to rectify the situation. This chapter addresses this research gap by examining how teachers' commitment to stay in the profession develops during the transition from teacher education into the job, from a comparative perspective in Germany, Taiwan and the U.S.

Much of the research about beginning teachers available took place within a single nation context, and – with very few exceptions (see the review on teacher motivation research in low-income contexts by Richardson, 2014) – was pre-dominantly in English-speaking countries (see, e.g., Ashiedu & Scott-Ladd, 2012; Howes & Goodman-Delahunty, 2015). These studies typically also relied on cross-sectional designs making it difficult to identify underlying causes, In addition, they focused on individual or school characteristics such as teachers' socio-

demographic background or student composition, which are difficult to change (see, e.g., Smith & Ingersoll, 2004). Finally, many studies use teacher samples from different subjects and school levels which neglects the domain-specificity of teaching demands. Thus, a significant research gap exists regarding comparative studies in which the same instruments is applied in several countries as part of a longitudinal design, particularly in the contexts of non-English speaking countries and focusing on teachers from one subject area.

The current study was designed to close some of the research gaps pointed out by using data from a longitudinal study with standardized instruments administered to beginning primary and lower-secondary mathematics teachers in three countries with different cultural backgrounds, namely Germany, Taiwan and the US. As longitudinal studies are very labor intense, the range of countries had to be limited to three. These countries were purposefully selected to represent one high-achieving East-Asian country with a Confucian heritage, one classical Continental European country and one English-speaking country. Three research questions were addressed in this study:

- 1) How are pre-service teachers' job motives, mathematics content knowledge and preparedness to teach mathematics associated with their commitment to stay the profession?
- 2) How is the perceived school context associated with beginning teachers' job satisfaction and the development of their commitment to stay in the profession over 3 years?
- 3) How generalizable were the results from a comparative perspective across Germany, Taiwan and the U.S.?

Conceptual Framework

Factors Affecting the Commitment to Stay in the Profession at the End of Teacher

Education

Evidence suggests combined effects of *job motives* and *teacher education outcomes* such as subject content knowledge and perceived preparedness on the commitment of teachers to stay in the profession (Blömeke & Kaiser, 2015; Watt et al., 2012). However, it is not yet known to what extent these factors are associated with teachers' commitment to stay in countries with different cultural backgrounds.

Based on expectancy-value theory (Watt & Richardson, 2007), teachers' job motives can be distinguished into extrinsic motives, intrinsic-pedagogical (or "altruistic"), and intrinsic-subject-related (König & Rothland, 2012). Extrinsic motives to enter the profession means that somebody wants to become a teacher mainly because of the salary paid or other favorable working conditions. Intrinsic motives can further be distinguished into pedagogical and subject-related motives (Brookhart & Freeman, 1992). Pedagogical motives include the motivation to work with children and to support their development whereas subject-related motives express the enjoyment of the content to be taught. Comparative studies revealed different levels of these specific motives across countries (Watt et al., 2012). Whereas future teachers from Western countries typically stress pedagogical motives only, those from some East Asian countries endorse subject-related intrinsic and extrinsic motives as well (Schmidt, Blömeke & Tatto, 2011). Whether and how such cultural differences influence the relationship between job motives and commitment in enter and stay in the profession is an open question.

Teacher education outcomes include several components, in particular cognitive and affective-motivational outcomes. Cognitive outcomes can – according to Shulman (1987) – be distinguished into content knowledge (CK), pedagogical content knowledge (PCK) and general pedagogical knowledge (GPK). With respect to the current study about beginning mathematics teachers, CK means mathematics content knowledge (MCK) and includes fundamental mathematical definitions, concepts and procedures. Mathematical pedagogical content knowledge (MPCK) includes knowledge about how to present these concepts and procedures to students. And GPK is defined as “broad principles and strategies for classroom management and organization that transcend subject matter” (p. 8). These knowledge facets are not only strongly correlated with each other but also to teachers’ job motives (Blömeke, Kaiser & Lehmann, 2010). Whether between-country differences exist in these relations has yet to be clarified.

The current study chose MCK as an indicator of mathematics teachers’ knowledge. Due to the strong correlation between MCK and MPCK only one of the two variables could be included to avoid the problem of multi-collinearity. Since MCK could be measured more reliably, we opted for this variable although MPCK is a crucial facet of professional competence as well. Furthermore, the between-country variance was higher because MCK of teachers in Taiwan was much higher than MCK of teachers in Germany or the U.S. (ibid.).

A crucial affective-motivational outcome is teachers’ perceived self-efficacy (Bandura, 1986; Pajares, 1996) as the belief of being prepared for and being able to tackle the most difficult challenges of teaching. Strong self-efficacy typically increases the commitment to stay in the teaching profession because teachers are more persistent and make stronger efforts to overcome challenges. Hong (2010) reported that a group of U.S. teachers who left teaching revealed significantly lower self-efficacy beliefs and lower job commitment than those staying in the

profession. These teachers reported at the same time lower leadership quality of and fewer appraisal from their principals than the other teachers.

With respect to the relationships among job motives, MCK and sense of preparedness to teach mathematics, evidence suggests that motives are often positively related to cognitive learning outcomes (Benware & Deci, 1984; Grolnick & Ryan, 1987; Singh, Granville & Dika, 2002). This positive relationship applies not only to the K-12 students but also to university students. Schiefele and Urhahne (2000) provided evidence that the level of German university students' intrinsic motivation significantly predicted study success. With respect to teachers, it is important to distinguish between pedagogical and subject-related intrinsic motives, however. Whereas the first were shown to be related to pedagogical knowledge, the latter predicted subject-related knowledge in a broad range of countries (Brouwer & ten Brinke, 1995; Keller-Schneider 2011; Watt & Richardson, 2007; Blömeke et al., 2012). Longitudinal studies revealed correspondingly that future teachers' motivation influenced their cognitive development during teacher education in this differential way (König & Herzmann, 2011; König & Rothland, 2012; Mayr 2009). However, most of these studies were carried out in one country only so that it is not widely known to what extent such results can be generalized across countries with different cultural backgrounds.

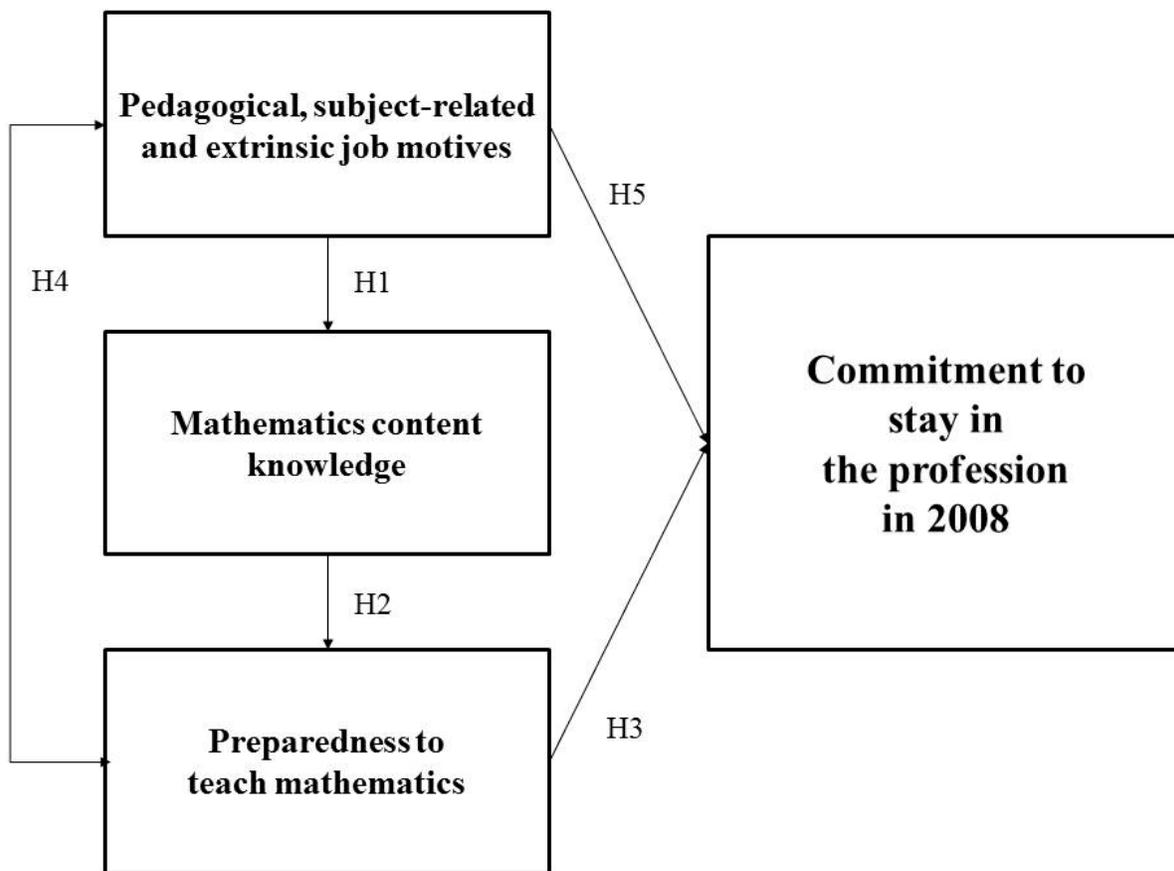


Figure 1. Hypothetical model of factors affecting teachers' commitment to stay in the profession at the end of teacher education

Against this state of research, one can hypothesize that teachers' subject-related job motives predict their MCK at the end of teacher education (H1). MCK in turn should predict teachers' sense of preparedness (H2) which is hypothesized to predict their commitment to stay in the profession (H3). Teachers' pedagogical and subject-related job motives may also be related to their sense of preparedness because depending on the type of job motives teachers may evaluate their teacher education program against different rationales (H4). Finally, job motives most certainly predict teachers' commitment to stay in the profession also directly because

stronger job motives should support stronger commitment to the profession (H5). Figure 1 displays this hypothetical model.

Although this general model fits well to the state of research, it might be necessary to distinguish between Germany and the U.S. on the one hand and Taiwan on the other hand with respect to H5. In the two Western countries, mainly pedagogical motives to go into teacher education were stressed whereas Taiwanese teachers also express subject-related and extrinsic job motives (Blömeke, Kaiser & Lehmann, 2010). This visible cultural difference in the absolute level of the constructs may also result in differential relational effects of job motives on the commitment to stay in the profession among beginning teachers in the three countries (H5a).

Furthermore, differential hypotheses may apply to H2, too. Given that Taiwanese teachers' MCK level was very high at the end of teacher education and way above the level of school mathematics even in the case of the lowest-performing teachers (see *ibid.*), it is hard to imagine that their sense of preparedness for teaching school mathematics would be strongly affected by MCK (H2a). Germany and the U.S. teachers performed in contrast only around the international average which means that low-performing teachers here revealed substantial deficits in MCK already on the level of school mathematics.

Factors Affecting the Development of Beginning Teachers' Commitment to Stay in the Profession

A hypothetical model of how the school context may affect beginning teachers' commitment to stay in the profession was developed based on models from occupational psychology. Its state of research indicates that job satisfaction is crucial for the commitment to stay in the profession (H1; Lubinski & Benbow, 2000; Judge, Bono, Erez & Locke, 2005) because if teachers are satisfied with their job, their organizational commitment is higher

(Bogler, 2002). Watt and Richardson (2008) confirmed this relation in their seminal work on job motives of teachers. Whether this state-of-research, mainly based on studies carried out in English-speaking countries, also applies to other countries is an open question.

Job satisfaction is hypothesized to be strongly influenced by leadership quality (H2) and perceived appraisal (H3) on the one hand, and two types of perceived job burden (generic burden and subject burden) on the other hand (H4, H5; Shen, Leslie, Spybrook & Ma, 2012; OECD, 2009; Tschannen-Moran, Hoy & Hoy, 1998). Figure 2 displays this chain of relations. It reveals the basic thinking that external classroom or school context factors may influence the internal commitment of individual teachers but that this process requires a mediating processing. Job satisfaction is assumed to be the mediator here.

Hackman and Oldham (1980) collected evidence on this chain in different types of jobs. The perceived feedback given to employees from their superiors was one of the strongest predictors of job satisfaction. Teacher-related research suggests a similar relationship. A climate of respect, recognition and appreciation significantly contributed to how teachers reported about their job satisfaction (Kouzes & Posner, 1999; Shen, Leslie, Spybrook & Ma, 2012). The TALIS results support the positive effects of teacher appraisal as well, and this with data from a broad range of countries (OECD, 2009). Teachers not only consider appraisal as a fair assessment of their work but also that it has a positive influence on their satisfaction. Support through feedback is particularly important for beginning teachers (Gimbert & Fultz, 2009).

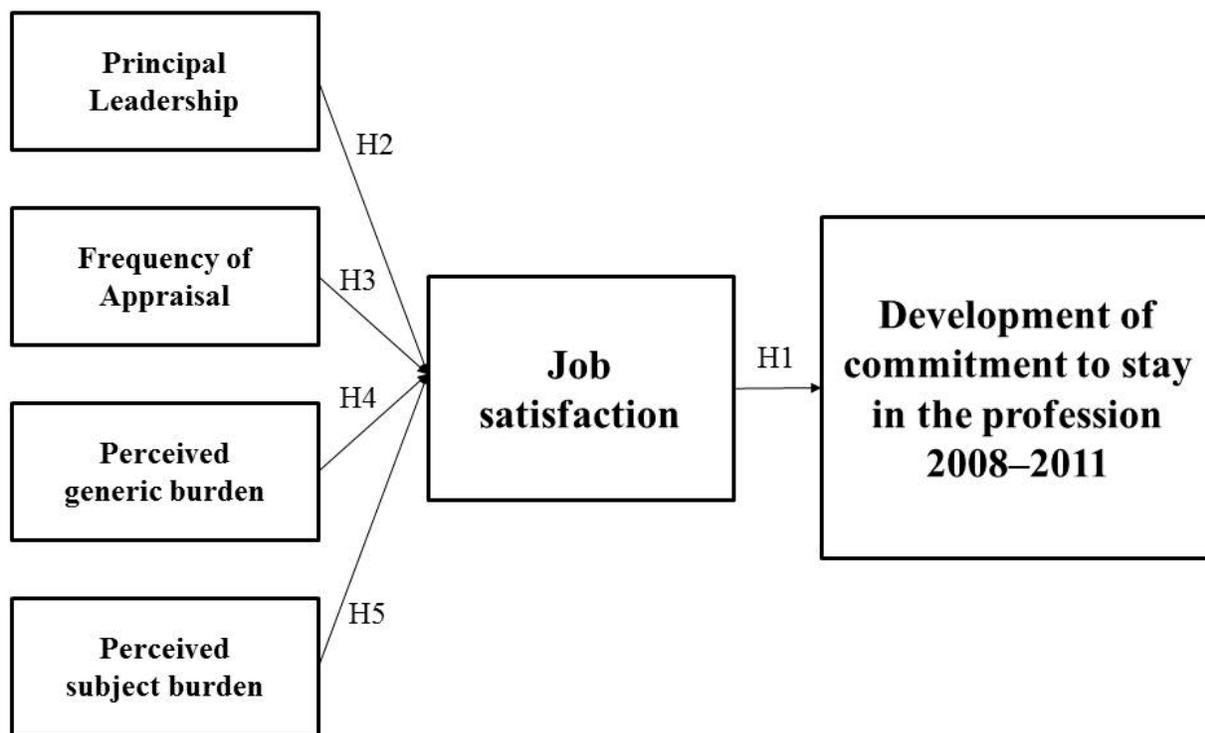


Figure 2. Hypothetical model of factors affecting the development of beginning teachers' motivation to stay in the profession

Teachers also report higher satisfaction when they have a chance to participate in decision makings at school (Perie & Baker, 1997; Shen, Leslie, Spybrook & Ma, 2012). The role of the principals and their leadership quality seems to be particularly important in this context. They can set the tone of a school (Valentine, Clark, Hackmann & Petzko, 2004). To support their teachers, principals should provide high-quality management through administrative leadership (Ma & MacMillan, 1999). This means that principals have a vision for their school and that they are able to communicate it to the teachers whilst including their ideas. Comparative research that implements the same instrument in several countries is lacking though.

In contrast to these school context factors that may increase the commitment to stay in the profession via higher job satisfaction, negative effects can be expected if the perceived burden of the job is high. Teachers perceiving their job as a burden contribute to larger proportions leaving the profession (Ingersoll, 2001). The burden can be distinguished into subject-related and pedagogical challenges. Teachers have to master instructional challenges such as lesson preparation and diagnosing student progress which are domain-specific tasks, in our case mathematics-specific. In addition, generic pedagogical tasks are to be mastered. These include classroom management, student motivation and cooperation with parents.

While this overall model does again fit well to the overall state of research, the question is whether it is in fact generalizable across different educational systems with different cultures. Most of the research was again conducted in Western countries and the few studies on non-Western countries revealed substantial differences (see the overview in Watt & Richardson, 2008). Given the strong MCK of Taiwanese teachers (Blömeke, Kaiser & Lehmann, 2010), it is, for example, hard to imagine that their job satisfaction is significantly predicted by the perceived mathematics-related burden (H4a).

Methodology

Sample and Study Design

About 3,000 primary and lower-secondary mathematics teachers from Germany, Taiwan and the US took part in the study which was implemented in 2011. The teachers were in their second or third year in the profession and they had been in their final year of teacher education in 2008 when they took part in TEDS-M (Tatto et al., 2008). From the US, both TEDS-M sub-

samples—public as well as private universities drawn in two subsequent years (public: 2008, private: 2009)—were included in the current study.

The TEDS-M samples were randomly drawn in a two-stage process in each of the countries. The TEDS-M quality standards required minimum participation rates for all target populations of the survey to ensure that bias resulting from non-response was kept within acceptable limits. The samples were organized according to important teacher education features such as the type of program (consecutive vs. concurrent programs), the school level to be taught (grade range included in the qualification, e.g. grades 5–10 vs. grades 7–12), the attention paid to learning opportunities (e.g., a major or minor in mathematics) and the region where the training was based (for example, federal states) in order to reflect accurately the future teachers' characteristics at the end of their education.

In all three countries, the TEDS-M samples had been followed up several times after the first measurement in 2008 via online surveys if the participants had agreed to such a follow-up. The proportions of teachers who did so varied substantially between the three countries and was high in the U.S. (about 80%) but low in Germany and Taiwan (about 60%). Those who had agreed were contacted via email or phone depending on the information they had provided in 2008. If the teachers could be located (about 80% in the U.S. and 60% in Germany or Taiwan) and agreed again to participate (about 80 to 90%), their data from 2008 and 2012 were linked via codes generated by themselves (worked out in about 90% of the cases). Sample sizes resulted finally in about 60% of the initial TEDS-M sample in the U.S. but only about 25% in Germany and Taiwan. However, potential bias introduced by attrition should not strongly affect the results since relationships are typically more robust than means.

Table 1

Characteristics of the Samples from Germany, the USA and Taiwan

	Germany N=412	USA N=2,239	Taiwan N=314
Primary teachers	47%	62%	40%
Females	76%	86%	56%
Age in 2008	28 years	25 years	24 years

In Germany, the 412 teachers represented two major groups (see Table 1): Almost half of the teachers were primary teachers trained in 5.5 year consecutive models with 3.5 years of university education followed by a 2-year practical training for teaching of all subjects including mathematics in primary school. On the other hand, lower-secondary teachers trained in 5.5 or 6.5 year consecutive models with 4 or 5 years of university education followed by a 1.5- or 2-year practical training for teaching either in grades 5 through 10 or in grades 5 through 13 in two subjects (mathematics had to be one of these subjects to be included in TEDS-M). Three quarters of the sample were female, and the teachers were on average 28 years old at the end of teacher education – thus, older than in the two other countries.

In Taiwan, the 314 teachers came from concurrent models that trained either primary teachers as generalists (including mathematics) which applied to 40% of the sample (see Table 1) or secondary teachers as mathematics specialists for teaching in grades 7 through 12. At the end of teacher education, they were on average 24 years old. The proportion of females was substantially lower than in the two other countries.

In the US, the characteristics of the two sub-samples from public and private universities with teacher education programs were similar. About 60% – and thus more than in the two other countries – of the 2,239 beginning teachers were primary teachers (see Table 1), meaning that they came from a program including the preparation for teaching in any of grades 1 through 4. They were on average 25 years old and the proportion of females was 86%.

Instruments

The dependent variable was the commitment to stay in the profession and it was surveyed two times, first at the end of teacher education in 2008 and then again three years later in 2011 after two to three years in the profession. The teachers were asked: “At this point, how do you see your future in teaching?” They had four options to answer which ranged from “I probably will not seek employment as teacher” (2008) or “I probably will not continue to teach much longer” (2011) to “I expect teaching to be my lifetime career” (2008) or “I would like teaching to be my lifetime career” (2011).

The initial commitment to enter and to stay in the profession 2008 was high in all three samples but even higher in the U.S. than in the German and here again higher than in the Taiwanese sample (see Table 2). However, in the US and the German samples the commitment decreased significantly until 2011 whereas the commitment remained stable in Taiwan.

Table 2

Descriptives for the different scales and time-points (mean, standard deviation)

Scales and time-points	Germany	Taiwan	USA
Pedagogical job motives 2008	3.3 (0.5)	2.7 (0.7)	3.5 (0.4)
Subject-related job motives 2008	2.5 (0.8)	2.0 (0.7)	2.2 (0.8)

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Extrinsic job motives 2008	2.4 (0.7)	2.3 (0.6)	1.9 (0.7)
Mathematical content knowledge 2008	557 (81)	654 (82)	537 (71)
Preparedness to teach mathematics 2008	2.7 (0.6)	2.6 (0.6)	2.9 (0.6)
Commitment to stay in the profession 2008	3.4 (0.6)	3.2 (0.9)	3.7 (0.5)
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Principal leadership 2011	2.9 (0.7)	2.9 (0.5)	2.0 (0.7)
Frequency of appraisal 2011	3.4 (1.2)	1.8 (0.9)	4.2 (1.0)
Perceived generic burden 2011	1.6 (0.4)	1.8 (0.4)	1.4 (0.4)
Perceived subject burden 2011	2.0 (0.4)	2.2 (0.5)	2.0 (0.5)
Job satisfaction 2011	3.0 (0.5)	2.9 (0.5)	2.8 (0.4)
Commitment to stay in the profession 2011	3.2 (0.5)	3.2 (0.9)	3.5 (0.7)

Note. Pedagogical, subject-related and extrinsic job motives=1–4 (not a reason—a major reason), Preparedness=1–4 (very ineffective—very effective), Commitment=1–4 (not seek employment as teacher—expect to be my lifetime career), Leadership and Job satisfaction=1–4 (strongly disagree—strongly agree), Appraisal=1–6 (never—more than once a month), Generic burden=1–3 (not a problem—major problem), Subject burden=1–4 (very easy—very difficult). The means of all scales rated on Likert scales represent the equally weighted means of the corresponding items. Mathematics content knowledge was estimated applying the Rasch model to TEDS-M 2008 data from all 16 countries participating and transformed into a scale with an international mean of 500 and a standard deviation of 100 test points.

In 2008, job motives, mathematics content knowledge and the future teachers' sense of preparedness were assessed at the end of teacher education as predictors of the teachers' initial commitment to enter and to stay in the profession.

Job motives were surveyed with three scales developed in the study “Mathematics Teaching in the twenty-first century (MT21)” (Schmidt, Blömeke & Tatto, 2011). Four items covered pedagogical motives, e.g. “I like working with young people.” Subject-related motives were captured with two items, e.g. “I love mathematics”. Three items covered extrinsic motives. “I seek the long-term security associated with being a teacher” was an example for this scale. All

items had to be rated on 4-point Likert scales from “not a reason” to “a major reason”.

Pedagogical motives were supported the strongest in all three samples (see Table 2), particularly in the U.S. and in the German one. The other two motives were in contrast less strongly supported, particularly lowly in Taiwan with respect to subject-related motives and in the US with respect to extrinsic motives.

MCK was assessed with a 45-minutes paper-and-pencil test in a standardized test session. The test included 72 items (Tatto et al., 2012) which were administered in a Balanced-Incomplete-Block Design. Scaled scores were created by applying the one-dimensional Rasch model implemented in the software package Conquest. The Taiwanese sample revealed outstanding MCK, more than one standard deviation above the knowledge levels in Germany or the US.

The teachers’ sense of preparedness was assessed with the following item: “Overall, how effective do you believe your pre-service teacher education program was in preparing you to teach mathematics?” Teachers had four options to answer from very ineffective to very effective. Teachers in the U.S. sample felt significantly better prepared than teacher in the other two samples were the average ratings were only around the scale’s midpoint.

In 2011, the administrative leadership quality of the beginning teachers’ principals, teacher appraisal as well as the perceived burden related to generic and subject-specific demands of the teaching job were surveyed as predictors how the commitment to stay in the profession had developed between the end of teacher education and after three years in the profession (difference in the estimates from 2008 and 2011).

The quality of the administrative leadership was captured by five items prompted by an initial request: “Please indicate the extent to which you agree or disagree with each statement”.

The items from the OERI Teacher Survey had to be rated on four-point Likert scales ranging from “strongly disagree” to “strongly agree”. Examples of items were: “The principal sets priorities, makes plans and sees that they are carried out” and “The principal knows what kind of school they want and have communicated it to the staff”. The three samples differed in their support of these statements with German and Taiwanese teachers agreeing significantly more strongly than the teachers from the U.S. sample.

The extent of appraisal was measured by identifying the frequency with which it occurred as undertaken in TALIS (OECD, 2010). Prompted by an initial question—“How often have you received appraisal and/or feedback from the following people about your work as a teacher?”—the beginning teachers had to rate three items that covered typical groups appraising mathematics teachers’ work: the school principal, an external inspector or the teachers’ colleagues. This had to be done on six-point Likert scales from “never” to “more than once a month”. In contrast to TALIS where a binary index was created from the data, we were able to build a latent construct with the three indicators. The three samples differed strongly in the amount of appraisal reported. Teachers from the US reported significantly more frequent appraisal than the German teachers and these reported again significantly more than the Taiwanese teachers in our samples.

The perceived burden connected to generic teacher tasks was measured by seven items. Prompted by an initial question—“What are some of the difficulties or challenges that you have encountered in your current teaching position?”—the statements had to be rated on three-point Likert scales ranging from “not a problem” to a “major problem”. Examples of items were “Classroom management/student behavior” and “Working with parents or guardians”.

The perceived burden connected to mathematics instruction was measured by four items covering typical tasks of beginning mathematics teachers. Prompted by an initial question—“In

the course of a year in the classroom, a teacher is expected to complete a diverse array of tasks. How easy was it for you to complete the following tasks?”—the items then had to be rated on four-point Likert scales ranging from “very easy” to “very difficult”. Examples of items were “Knowing/ understanding math content” and “Planning math lessons”.

Generally, the reported burden was low in all three countries and in both respects as indicated by average ratings below the scales’ means. The U.S. sample reported particularly low perceived burden whereas the perception was in both cases the highest in Taiwan.

Several approaches exist to define job satisfaction. We selected a well-established approach by having the beginning teachers report their feelings (Oshagbemi, 1999). Such manifestations constitute an empirical definition of teacher satisfaction and have been proven to be effective indicators. They acknowledge that teachers commonly indicate job satisfaction in terms of feeling good when they are at work (Taylor & Tashakkori, 1995). Four items had to be rated on four-point Likert scales ranging from “strongly disagree” to “strongly agree” after the initial request “Overall, my job is ...”. Examples of items were “enjoyable” and “fulfilling”. Teachers from all three samples reported high job satisfaction.

The second survey in 2011 was administered online. This was the only way to do the study in a feasible way given that the beginning teachers were distributed across the whole countries, sometimes with only one teacher from the TEDS-M study at a school. As an additional benefit, the online data collection reduced the costs of the survey and it yielded a more accurate and timely available database. The Teacher Education and Development Study in Mathematics – Follow Up (TEDS-FU) questionnaire could only be filled in via the Internet. No other options were permissible, such as sending PDF documents via email or printing out the questionnaire

and mailing them. The process was managed in the USA and operated in parallel for Germany, Taiwan and the USA.

Data Analysis

The research questions were addressed through multiple-group path analyses after confirmation of metric measurement invariance (Horn & McArdle, 1992). Maximum likelihood parameter estimates with standard errors and a chi-square test statistic robust to non-normality were applied as implemented in the software package MPlus 7.1. Multiple linear regression standard errors were computed using a sandwich estimator. First, models including all hypothesized relationships were estimated. To accomplish parsimonious model, non-significant relations were eliminated before testing the hypotheses again. Evaluation of model fit happened via absolute and relative fit indices. Estimates of the comparative fit index (CFI) $>.95$ indicate a very good, estimates $>.90$ indicate a good fit. Root mean square error of approximation $<.05$ indicate a very good fit, estimates $<.08$ indicate a good fit (Fan, Thompson & Wang, 1999; Hu & Bentler, 1999).

Results

Factors Affecting the Commitment to Stay in the Profession at the End of Teacher

Education

The final parsimonious model that tested the hypotheses about job motives, MCK and the teachers' sense of preparedness as predictors of their initial commitment to stay in the profession as displayed in Figure 1 fit well to the data (CFI=.90, RMSEA=.06).

Table 3

Standardized Path Coefficients of the Hypothetical Model Displayed in Figure 1

	Commitment to Stay in Profession			Preparedness			MCK		
	GER	USA	TW	GER	USA	TW	GER	USA	TW
Pedagogical motive	.11*	.23*	.34*	.10	.09*	.13*	---	---	---
Subject-related motive	.00	.00	.16*	.23*	.12*	.25*	.29*	.25*	.34**
Extrinsic motive	.00	.00	.10*	---	---	---	---	---	---
Preparedness	.12*	.06*	.00	---	---	---	---	---	---
MCK	---	---	---	.14*	.07*	.07	---	---	---

Note. MCK=Mathematical content knowledge, GER=Germany, USA=United States of America, TW=Taiwan, * $p < 0.05$

As hypothesized, teachers' subject-related job motives to enter teacher education were significantly associated with their MCK level, and this applied in all three countries and with medium effect sizes (H1; see Table 3). MCK in turn was – as hypothesized – in the two Western countries significantly positively related to teachers' sense of preparedness at the end of teacher education (H2) but not in Taiwan which supported the differential effect hypothesized (H2a). However, the effect sizes were small in the two first cases. In all three countries, teachers' sense of preparedness was – as hypothesized – also significantly related to their job motives (H4).

Teachers' commitment to stay in the profession as expressed at the end of teacher education was significantly associated with the teachers' pedagogical motives, and this applied in all three countries as hypothesized (H5). Whereas the strength of the relation was weak in Germany and the U.S., it was of medium effect size in Taiwan. Teachers' commitment to stay in the profession in Taiwan was significantly related to subject-related and extrinsic job motives (H1a), but not in Germany or the U.S. Teachers' commitment to stay in the profession was significantly and positively related to their sense of preparedness (H3) – but this only in the two

Western countries—Germany and the U.S. In Taiwan unexpectedly no statistically significant relationship was confirmed.

Factors Affecting the Development of Beginning Teachers’ Commitment During the First Years

The final parsimonious model that tested the hypotheses about the school context and teachers’ perceived burden as predictors of job satisfaction which in turn predicts the development of their commitment to stay in the profession as displayed in Figure 2 fits very well to the data (CFI=.98, RMSEA=.04).

The data supported the crucial role of job satisfaction (see Table 4). As hypothesized, job satisfaction was significantly and positively associated with the development of teachers’ commitment to stay in the profession from 2008 to 2011 in all three countries (H1). This means that the higher beginning teachers’ job satisfaction was, the more their job commitment grew during the first three years in the profession.

Table 4

Standardized Path Coefficients of the Hypothetical Model Displayed in Figure 2

	Development of job commitment			Job satisfaction		
	GER	USA	TW	GER	USA	TW
Satisfaction	.29*	.33*	.19*	---	---	---
Generic burden	---	---	---	-.36*	-.40*	-.19*
Math-related Burden	---	---	---	-.03	-.11*	-.10
Appraisal	---	---	---	.16*	.03	.06
Leadership	---	---	---	.06	.18*	.14*

Note. GER=Germany, USA=United States of America, TW=Taiwan, * p<0.05

Job satisfaction was significantly and negatively related to the perceived generic burden in all three countries (H5). If teachers reported problems with classroom management or collaboration with parents, their job satisfaction was significantly lower. The relationship was stronger in Germany and the U.S. than in Taiwan which may reflect cultural differences in classroom behavior of students and teacher status. Differential effects existed with respect to the perceived mathematics-related burden (H4). As hypothesized, no significant relation existed in Taiwan (H4a) but in the U.S. Unexpectedly, no significant relationship was found in Germany.

Differential effects existed in the relationships between leadership and appraisal and teachers' job satisfaction (H2, H3). Each time the pattern was different for Germany on the one hand and the U.S. and Taiwan on the other hand. Whereas in Germany the perceived frequency of appraisal was significantly and positively associated with teachers' job satisfaction but not the perceived quality of leadership at their schools. In contrast, in the U.S. and Taiwan, the perceived quality of leadership was significantly associated with teachers' job satisfaction but not the frequency of appraisal.

Discussion and Conclusions

Commitment to the teaching profession at the end of teacher preparation could be explained by a combination of job motives and teacher education outcomes in Germany, Taiwan and the U.S. The present study confirmed, based on empirical data, significant relationships in all three countries (see, e.g., Watt et al., 2012). Similarly, the development of beginning teachers' commitment could be explained by a combination of perceived job burden and school leadership quality in the three countries (mediated by job satisfaction) which fits to the overall state of

research as well (see, e.g., Shen et al., 2012). Although the three samples were not necessarily representative of beginning teachers because of attrition or other pathways into teaching, the results can be regarded as quite robust because, in contrast to means, relationships between constructs are usually not too strongly affected by bias in a sample.

Between the three countries included in the present study, structural differences in the relations between the constructs so that researchers need to be careful with generalizing results based on data from one country only. This is a distinct outcome of our comparative study given that most study were done within one single nation.

The initial commitment to stay in the profession in Germany and the U.S.—the two Western countries, was significantly associated with the level of pedagogical motives, but not with extrinsic or subject-related job motives. These results may point to a potential lack of external incentives, for example in terms of salary, reputation or career options, to go into teaching. The commitment of German and U.S. teachers was significantly associated with the teachers' sense of preparedness which in turn was associated with their MCK. Subject-related preparation seems to be an issue. The German and U.S. teachers with higher MCK reported to be better prepared and more committed to stay in teaching than the other teachers with lower MCK in these two countries.

In contrast, teachers' commitment in Taiwan was not significantly associated with the teachers' sense of preparedness, which was also not significantly associated with their level of MCK. Therefore, the levels of preparedness or MCK do not seem to matter in terms of their commitment to stay in teaching in Taiwan. We interpret this result as a consequence of a generally strong knowledge base so that even “weaker” mathematics teachers did not struggle. Again in contrast to the relationships in the two Western countries, stronger extrinsic and

subject-related motives seemed important to Taiwanese teachers' job commitment. Taiwanese teachers who were more motivated extrinsically were also more committed. This result may point to the relevance of external incentives to become a teacher in Taiwan. Teaching is a rewarding profession in this country in many respects because of purposefully developed government policies to ensure that the best students go into this profession. The state grants them with a generous salary, favorable holidays etc. (Schwille, Ingvarson & Holdgreve-Resendez, 2013). These different patterns in the effects of job motives and teacher education outcomes on future teachers' commitment to stay in the profession may reflect cultural and policy differences in teacher status and reputation between Western and East Asian countries.

How the commitment then developed during the first years in the profession depended in all three countries strongly on the quality of the school context, more precisely on the level of job satisfaction, which was associated with perceived burden, frequency of appraisal, and perceived quality of principal leadership. In Germany, appraisal and feedback played a crucial role, in the U.S. and Taiwan the perceived quality of principal leadership seems to matter more. This different result may come from the different leadership models and labor market options across the three countries. If leadership plays a strong role in a school community and if different job opportunities exist, a will to change may come easier if leadership quality does not meet the expectation of a beginning teacher. Both conditions apply more strongly to the U.S. and Taiwan than to Germany. In the U.S., principals are part of a clear-cut hierarchy including hiring and firing of the teaching staff and reporting to local school boards. This organization makes leadership quality crucial for the functioning of a school. As a side remark, it may be interesting to note that the level of leadership quality reported from teachers working in this system was lower than from teachers in the other two samples. In Taiwan, the power of principals and

teachers' agreement with leadership decisions play an important role for cultural reasons even though formal opportunities to hire or fire teachers by principals do not exist. At the same, in both the U.S. and Taiwan plenty of alternative job opportunities exist for mathematics teachers.

Germany is "the odd man out" in this context. The labor market is generally not very flexible and it is particularly difficult for teachers who often are civil servants to opt for a different career. Furthermore, principals do not have a clear leadership role. Their responsibilities include in some states the opportunity to suggest which teachers should be hired but the formal responsibility lies at the regional or federal school authority and it is furthermore almost impossible to fire a teacher. In this respect, the German leadership model is similar to Taiwanese one without the culturally given hierarchy.

One of the strongest results that can be generalized across countries is the crucial role of job satisfaction for the development of teachers' commitment. This finding is consistent with research findings from other occupations on the mediating effect of job satisfaction (see, e.g., Lubinski & Benbow, 2000; Judge, Bono, Erez & Locke, 2005). Although other factors may exist that influence teachers' commitment, investing in teachers' satisfaction would probably pay off in terms of reduced attrition rates. Increasing subjective well-being by reducing sources of perceived burden such as classroom-management challenges or challenges related to mathematics instruction and/or improving school context characteristics by providing support in term of feedback or administrative leadership seem to be promising approaches. However, the specifics may depend on the country because countries differ in the respective relationships. Countries are therefore advised to strengthen research in this respect.

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