



Designing a Longitudinal, Quantitative Measurement of Teachers' Beliefs about Multilingualism: A Research Protocol

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Article Info	Abstract
Received: 2024-06-29	An increasing necessity to prepare future teachers to cater for the needs of multilingual learners has led to growing research in education and educational linguistics across the world. This paper presents the methodological design of a longitudinal research project that measures the affective-motivational competence development of pre-service teachers with regard to multilingual learners. The project is based within a large German teacher education programme during which pre-service teachers attend several compulsory modules on multilingualism as part of their early professionalisation. The affective-motivational competence development of two full cohorts of prospective middle school teachers (n = 499) is observed in four test intervals across their five-year programme. The present paper limits itself to reporting on the complex design, the measurement instruments, and the methodological challenges of a longitudinal observation of relevant competence facets. The paper closes with a critical reflection of both the opportunities and the limitations of the research design presented here. Keywords: Pre-service teachers; teachers' beliefs; competence development; multilingual learners; opportunities to learn.
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Introduction

Dealing with multilingualism and linguistic diversity in educational settings has become a prominent area of research in teacher education and educational linguistics (Bale et al. 2023; Krulatz et al., 2022; Neokleous & Karpava, 2023). Local demands and the discourse surrounding the necessity to prepare future teachers for multilingual learner groups differ immensely across the globe (Paetsch et al., 2023; Wernicke et al., 2021). These global and indeed regional differences extend to systemic differences in how teacher education is designed, how multilingualism ('the multilingual learner') is conceptualised, and which competencies and skills are considered important for future teachers, among others. (Schroedler, 2021).

The aim of the current study is to create a better understanding of the longitudinal development of affective-motivational teacher competence concerning multilingual learners and multilingual classroom settings. In addition to a description of the elaborate study design



and the progress of ongoing research, we will point out its unique and innovative components for this field of research as well as critically questioning the limitations and resulting research goals. The paper at hand describes these aspects in the German context, and focuses on the way professional teacher competence in the area of catering for the needs of multilingual learners a) is conceptualised in educational research, b) has become a (perceived) necessity in teacher education, and most centrally c) how it is researched in the project that is presented in this paper. The paper limits itself to presenting and discussing the research design of the project, and does not present data analyses.

In what later came to be known as Germany's PISA shock in the year 2001, various weaknesses of an education system (that was thought to be relatively well functioning, equalitarian and humanistic) were exposed. Perhaps the most prominent issue concerned the educational success of learners with a so-called migrant background. PISA data revealed that learners who have a migrant background, and often speak home languages other than German, repeatedly experience severe educational disadvantages. This finding was confirmed by other large-scale international assessment studies such as TIMSS and PIRLS (Baumert et al., 2006; Deutsches PISA-Konsortium 2001; Henschel et al., 2022; Meier-Braun & Weber, 2013; Stanat, 2006). While academic work on multilingualism and linguistic integration of learners who speak home languages other than German certainly has a far longer tradition, it was in the early 2000s that educational policy began shifting substantially. One central strategy to counter educational inequalities was to change teacher training and to equip pre-service teachers with skills and knowledge to cater for language development and multilingualism in the classroom (Berkel-Otto et al., 2021; Schroedler et al., 2023a).

General research into teacher professionalisation and teacher competence has experienced increased popularity over a similar timeframe. Mainly educationalists have developed models and frameworks of such constructs (e.g. cognitive competence, affective-motivational competence, teacher noticing), and have employed them for various purposes (Blömeke et al., 2008; Kaiser & König, 2019; Meschede et al., 2017; Paetsch et al., 2023).

In order to introduce the complex design of the project, the following section provides the contextual background to the German education system and the compulsory module on German as a second language (GSL) for pre-service teachers. Some central theory on teacher competence is presented before an overview of the underlying concepts and constructs of the instruments that are employed in this study is provided. Following a summary of the aims of the project, the research methodological design is introduced. We then discuss the potential of the dataset as well as potential pitfalls in designing and conducting a study like the one presented here. The paper closes with a critical reflection of the study's limitations followed by a brief conclusion. As indicated above, this is a methodological contribution and no data is presented.

Research context

Germany has a federal principle of administration and, thus, delegates certain issues, including education, to its 16 federal states (*Bundesländer*, hereinafter: states) and their governments. As a result of this, there are substantial differences between the states. However, there is a general coordination of the state policies by the federal planning and policy authority called Kulturministerkonferenz, acronym KMK (the standing conference for ministers of education) (cf. Çökmez, 2022).

Broadly speaking (in most states), compulsory schooling begins with four years of primary school followed by five (in some states six) years of secondary/middle school. Children enter primary school at the age of six. Secondary education is rather complex given that pupils are distributed across different types (streams) of secondary schools (e.g. school types that are geared towards more academic teaching or towards vocational training). This (early) selection process is often based on primary school teachers' recommendations as well as on selection criteria of the intaking secondary schools (Çökmez, 2022). After completing lower secondary education (roundabout at the age of 15), pupils can continue to pursue their *Abitur*, which is a high school certificate that allows them to enter tertiary education.

To become a qualified teacher in the public education system, (in most states) candidates complete a three-year undergraduate degree in two typical school subjects (e.g. mathematics, German, geography, history, social sciences, physical education, physics, chemistry, English, French, etc.). Following this, candidates complete a two-year M.Ed. programme, in which they continue acquiring subject expertise as well as pedagogical methods and educational knowledge. Pre-service teachers then enter an 18-month induction phase during which they work in a designated school, but also attend several seminars in regional teacher education centres, and have to demonstrate good teaching practice in regular school visits (Böning, 2023).

As previously noted, the first PISA results in 2001 as well as following waves of large-scale international comparison studies such as PIRLS and TIMMS revealed fundamental weaknesses of the German education sector as it became clear that learners of migrant background, who often speak home languages other than German, experience substantial educational inequalities. As a consequence of this, a need to change educational policy with regard to preparing pre-service teachers to cater for the needs of multilingual learners was perceived. Given the full authority over their entire education system (including tertiary education), the responses of the different states with regard to changing teacher education policies varied (see, Berkel-Otto et al., 2021). North Rhine-Westphalia (the largest state, with a population over 18 million inhabitants) was the first administration to introduce a compulsory module for all pre-service teachers (regardless of their subjects, and regardless of whether they aim to become primary, middle or high school teachers), in which they would learn how to cater for the needs of multilingual learners in the classroom setting (Ministry for School and Education of the State of North Rhine-Westphalia, 2009). At the University of

Duisburg-Essen, the module for teaching GSL is compulsory for pre-service teachers of different school types and includes a total of 12 credits (360 hours workload) for lower secondary school teachers (6 credits during their BA and 6 credits during their M. Ed.). Within the framework of this module, students in the Bachelor's and Master's programmes deal with the following main topics: multilingual and second language acquisition, specialised language (e.g. BICS and CALP), language diagnostics, text analysis, different approaches and methods of language education, language in teaching and learning materials, reading and writing in school subjects as well as linguistically-responsive teaching.

In order to better understand the competence development with regard to dealing with multilingual learners of the pre-service teachers attending the programme, a longitudinal study was launched in 2021. The evaluation study aims to answer questions about the professional beliefs of prospective teachers about linguistic diversity, how these develop over the period of teacher training as well as further aspects of how professional teacher competence (both affective-motivational and cognitive) corresponds to sociodemographic factors and other variables. This in-depth study began in April 2021 and will last until February 2025, including four data collection time points (t1 – t4). Two full cohorts of pre-service teachers are surveyed from their early study phase during their B.A. until the end of their M.Ed. programme (cf. Schroedler et al., 2023b).

Theoretical framework

This section introduces selected theoretical constructs concerning professional teacher competence that are relevant for the project's research methodology. These theoretical underpinnings include teacher professionalisation in general, the difference between cognitive and affective-motivational teacher competence as well as the role of opportunities to learn (OTL) in teacher education.

Conventional models of teacher competence assume that teachers' professionalism can be operationalised and taught¹. In theory, pre-service teachers can learn how to teach successfully by being exposed to formal and non-formal input throughout teacher education and their teaching career, that causes professional development in specific areas as a measurable output. Most current models of teacher competence are rooted in early work by Shulman (1986, 1987), and understand competence as something that can be acquired through education and training. The introduction of the idea that teachers need pedagogical knowledge (PK), content knowledge (CK) and pedagogical content knowledge (PCK) is central to this day (Baumert & Kunter, 2011; Krauss et al., 2008; Loewenberg Ball, et al., 2008). Without taking a negative stance towards alternative models, we use Kaiser and König's (2019) model of teacher competence as a point of orientation. This model differentiates between the aforementioned CK, PK and PCK, but adds teaching practice (TP) as an important fourth pillar

¹This sometimes stands in contrast to structural-theoretical teacher professionalisation theories, which focus on the complexity of the teaching practice and professionalism and the role of the educational and professional biography of (pre-service) teachers (Bonnet and Hericks 2014)

in the context of teacher education. Pre-service teachers need to engage with these four fields through opportunities to learn (OTL). These OTL, alongside general (e.g. institutional) processes as well as individuals' backgrounds and dispositions, result in (dispositional, situative) professional teacher competence. This professional competence is divided into cognitive and affective-motivational competence (Kaiser & König, 2019). The research project presented here, therefore, aims to create a better understanding of the complex interdependency between OTL, cognitive competence, and affective-motivational competence with regard to preparing pre-service teachers to teach in multilingual classroom settings. It is thus important to introduce some theory and current research findings on these three constructs in the context of preparing teachers to cater for the needs of multilingual learners. The idea that pre-service teachers need OTL to acquire knowledge and competence relevant to the teaching profession during teacher education programmes is somewhat self-evident. As shown above, these OTL include components on PK, CK, PCK and TP. Generally, this can include any opportunities to acquire (professional) skills or competences within (or beyond) an education programme. In the context of teacher education, these opportunities may be in the form of seminar sessions, lectures, reading, the writing of essays or term papers, etc. OTL is a classic variable to measure if students (in this case pre-service teachers) have had an opportunity to acquire certain skills or knowledge that is tested throughout their education (Blömeke et al., 2010; Christiansen & Erixon, 2021; Dunekacke et al., 2021; Evens et al., 2017; Schmidt et al., 2011). Applying this variable to a test or measurement of competence is crucial for validity, following the logic that those OTL used by the pre-service teachers lead to an increase of their competences (König et al. 2017). Therefore, it is very important to know what form these opportunities took in particular when assessing the outcome or competence development (Cramer, 2012; Ehmke & Lemmrich, 2018; McDonnell, 1995). What exactly can be considered a relevant OTL varies depending on the context of what is being measured. For the context presented in this paper, relevant OTL are all scenarios in which pre-service teachers have the opportunity to engage with the topics of multilingualism or GSL. Many of these OTL are provided in the compulsory modules that pre-service teachers attend during their teacher training programme, as described above. In the German context, pioneering work on assessing the quantity of relevant OTL (in the area of multilingualism / GSL) has been conducted by Ehmke and Lemmrich (2018), who developed, piloted, and validated an instrument, which has already been applied in different projects (Schroedler & Stangen, 2019; Stangen et al., 2020). This instrument is used in the project presented here and will be described precisely further below (see: instruments).

When attempting to measure cognitive competence or knowledge in the area of multilingualism of pre-service teachers, it first of all needs to be clarified that there is no clear consensus whether these competences are seen as PK, CK or PCK (Krumm et al., 2010). Bunch (2013) suggests that knowledge related to multilingualism/language learning can be regarded as part of general pedagogical knowledge: 'the pedagogical language knowledge of

mainstream teachers can be construed as knowledge of language *directly related to disciplinary teaching and learning and [it is] situated in the particular (and multiple) contexts in which teaching and learning take place*' (Bunch, 2013, p.307, emphasis in the original). Following this, knowledge about teaching in multilingual settings can be considered as a facet of general pedagogical knowledge. Carlson et al. (2018) developed a model that captures teacher competence for teaching GSL. This model was successfully transferred into a test instrument (*DaZKom-Test*), which itself has been employed in numerous studies to analyse relevant cognitive competence development of pre-service teachers in Germany (Paetsch et al., 2019; Stangen et al., 2020). Naturally, there are numerous ways to assess the competence or knowledge of pre-service teachers with regard to their skills for dealing with multilingual learners. As it depends on how the 'target competence' is defined (e.g. which facets of knowledge about the multilingual learner, which aspects of teaching methodology, which terminology, etc.), approaches to testing the 'right' competence differ. What has been chosen for the study at hand is an assessment at the beginning of the pre-service teachers' M.Ed. programme of declarative knowledge which was integral to their B.A. curriculum (see: instruments).

Assessing the affective-motivational competence of pre-service teachers with regard to multilingualism and multilingual learners has become an enormously prominent area of research in recent years (Haukås, 2016; several contributions in special issue Lundberg & Brandt, 2023; Paulsrud et al., 2023; Young, 2014). Research on teachers' beliefs or attitudes towards multilingualism is particularly helpful as studies demonstrate that these beliefs guide teachers' actions and thinking (Fives & Buehl, 2016). However, several studies suggest that teachers may have (very) positive beliefs towards multilingual learners, yet these beliefs are not represented in their practices (De Angelis, 2011). Moreover, a number of studies point out that teachers' beliefs depict a complex personal interweaving that can have an impact on teacher behaviour in the classroom and even on student learning (Fischer, 2018; Fives & Buehl, 2012; Schroeder et al., 2011). This implies that the development of affective-motivational competence needs to be understood in a more precise manner, and research has yet to clarify how the two competence domains (affective-motivational and cognitive) are intertwined.

Considering affective-motivational competence development in pre-post or longitudinal designs has brought to light another important question. So far, there is no clear consensus whether (and under what circumstances) beliefs can be changed through interventions. Some research on teacher beliefs about multilingualism has shown that, in principle, these beliefs can be changed (Fischer & Lahmann, 2020; Kirsch & Aleksić, 2018). This, however, depends on the strength of a particular belief system, and what is also frequently addressed is the challenging process of attempting to change teachers' beliefs (Haukås, 2016; Lundberg, 2020). Fives and Buehl (2012) suggest that teachers' beliefs may differ in stability depending on the context. Beliefs which are firmly rooted are expected to remain stable while newer and, thus,

less internalised beliefs are less stable and are more apt to change (ibid.). Another important issue in the discourse about the changeability of pre-service teachers' beliefs is the question to what extent such changes are a result of 'good' OTL. Paetsch et al. (2023) focus on the relationship between OTL and teachers' beliefs with a large sample (N=428) and conclude that in general beliefs can change in certain domains, and especially teacher students who study GSL develop stronger beliefs about language supportive teaching.

Materials and Methods

The study at hand aims to create a better understanding of the longitudinal competence development of pre-service teachers with regard to the skills and competences for catering for the needs of multilingual learners. In order to explain the purpose and the complex longitudinal design of the study, this section opens with an introduction to the instruments that are employed. The second part of this section describes the data collection process, and provides details with regard to the differences and commonalities between the four measurement points (t₁ - t₄).

Instruments

To survey the competence development of the pre-service teachers attending the programme described above, two existing (piloted and validated) questionnaire instruments were employed. Beyond these two validated instruments (for beliefs and for OTL), further parts of the questionnaire have been carefully designed to access a) relevant sociodemographic data, b) student responses to the module's design, and c) a test of declarative knowledge. Overall, five different instruments were used, though not each one at every measurement point. These five questionnaire parts (instruments) are described here.

Sociodemographic data

Each participant was asked to provide information on their age, gender as well as their educational biography. Pre-service teachers in the sample were asked to indicate their study subjects (e. g. physics, history, French, mathematics), if they themselves and their parents were born inside or outside of Germany, and whether they grew up with more than one language. Moreover, participants were asked about their high-school (university entry) grades, and about the duration of their tertiary education at the point of participating in the study.

Module evaluation

Evaluating student satisfaction with the ways in which each module was implemented was a second integral part of the study at hand. Hence, all participants were asked in the beginning and towards the end of their modules on multilingualism/GSL, to what extent they were happy with the selection of contents, the ways in which they were conveyed, etc. Course evaluation grids differed between the measurement points that preceded the modules (here participants were asked about their motivation and expectations) and the measurement

points after module completion (rating of own satisfaction regarding the module structure, contents, teaching, degree of difficulty, etc.).

Beliefs

The central part of the questionnaire was a collection of three scales with a total of 21 items on the professional beliefs about multilingual learners and multilingualism in teaching. This instrument has been carefully designed, piloted, and validated by Fischer and is available open access (cf. Fischer, 2018, 2020; Fischer & Ehmke, 2019, 2020). The instrument includes three scales: multilingualism in the home (5 items), multilingualism in teaching (7 items) and teacher responsibility for providing language support (9 items). Scale 1 (multilingualism in the home) captures pre-service teachers' epistemological beliefs about multilingual students' language use at home. Scale 2 (multilingualism in teaching) records beliefs about the design of subject lessons in terms of allowing or suppressing the heritage languages of multilingual learners. Scale 3 (teacher responsibility for providing language support) covers beliefs about the understanding of roles with regard to language support in the subject lessons (cf. Fischer 2018, 40). Participants are asked to rate their agreement on a 4-point Likert-scale-type response format ((1) 'strongly disagree', (2) 'rather disagree', (3) 'rather agree' and (4) 'strongly agree').

Every scale begins with a short stimulus illustrating a certain authentic situation or teaching environment. (Example: Imagine the following situation: You are teaching the number range of 100 in maths. Cem raises his hand and says: "In Turkish, one is called *bir* and 21 is called *yirmi bir*!"). This is followed by short statements such as 'In class, multilingual pupils should speak only German, as a change of language could irritate them.' Overall, 14 statements were negatively worded, and were then coded reversely in the dataset to ensure that welcoming beliefs about multilingualism in the participants' response pattern is adequately reflected in the data.

Opportunities to learn

To capture the amount of relevant OTL that the participating pre-service teachers have had during their study programme, two scales with a total of 24 items are used. These scales have been developed and validated by Ehmke and Lemmrich (2018). The first scale covers themes and contents on 16 items relevant to professional teacher knowledge in the area of migration, multilingualism, linguistic diversity, etc. Participants were posed the question: "How intensively have you covered the following contents during your entire teacher education programme?", and were asked to rate each item on a scale from 1 'not at all' to 10 'extensively'. The second scale (eight items) aims to gain a better understanding about more practice-oriented relevant OTL. Participants were asked "Throughout your teacher education programme, in how many seminar or lecture sessions have you done the following?" (response scale 0 'never' to 'more than 12'). The items on this scale include topics such as designing a linguistically-responsive lesson or analysing authentic classroom interaction.

Knowledge test

In order to gain some insights into participants' cognitive competence, a short knowledge test was used as part of the data collection. This test includes 14 test items (some of which are subdivided into up to 19 sub-questions). The test was only used at t_3 (beginning of the participants' M.Ed. programme) and contained items that originated from a written exam all participants had to sit 1.5 years prior, at the end of their B.A. module. All items are multiple choice. Questions address types of language acquisition, language learner biographies, minority languages, language diagnostics, etc.

Study Design

Data in this study is collected over a timespan of four years. Two full cohorts of pre-service teachers for middle schools ($N=499$) are surveyed over four data collection points ($t_1 - t_4$). For the sample to be as representative as possible, a systematic full cohort sampling was chosen. This means that over 90% of pre-service teachers participate at each data collection point.

At this point, it is important to emphasise that participation in the study is voluntary. All participants were informed that the data for the study would be collected and stored according to ethical standards and in compliance with data protection regulations.

As introduced in the research context section, pre-service teachers in the programme attend compulsory modules on multilingualism/GSL once during their B.A. and for a second time during their M.Ed. programme. The B.A. module consists of a lecture and an accompanying seminar during the same semester. The module is completed with an exam, and is usually attended in the fourth semester of the teacher training programme. The M.Ed. module consists of two seminars, which are attended in two subsequent semesters (usually semester 1 and 2 of the M.Ed. programme). It is finished with an oral exam after the second seminar. Looking at the entire teacher education programme, its 6-semester B.A. phase and its 4-semester M.Ed. phase, it can be seen that the longitudinal design of the study allows for professionalisation development measurement of over half of the teaching degree. Figure 1 illustrates the structure of the teacher training programme as well as the data collection points.

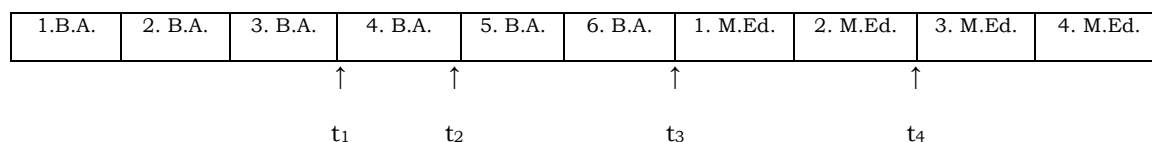


Figure 1: Teacher degree structure and measurement points

It should be clarified that it is not uncommon in tertiary education in Germany to have relatively unstructured individual tracks through a degree programme such as the teacher training programme. This means that many students may complete their undergraduate module on multilingualism either earlier or later during their programme. Many students may take much longer than six semesters to complete their undergraduate degree. While the B.A.

can only be taken up once a year in the winter semester, the M.Ed. can be taken up either in the winter semester or in the summer semester. This poses a challenge when designing a study such as the one described here. The best possible solution was therefore to begin with observing two full cohorts during the B.A. module (which is offered every summer semester) during the summer semester 2021 and 2022. All registered students were asked to fill in the questionnaire at the beginning of term in early April, and then again after the end of term in July. Given the variability in timing as described above, data collection for the M.Ed. part was somewhat more difficult. In order to observe as many students as possible who attended the module during their B.A. in 2021 and 2022, data collection for t_3 began in the beginning of the winter semester 2022, when technically most students who attended the B.A. module in 2021 should have been taking up their M.Ed. module on multilingualism. Given that the M.Ed. module can be started every semester, t_3 data collection was conducted with all students beginning their seminars of the M.Ed. Module in winter semester 2022 (early October 2022), summer semester 2023 (early April 2023), winter semester 2023 (early October 2023) and summer semester 2024 (early April 2024). Following the same logic, all t_4 measurement points were rolled out at the end of summer semester 2023 (early July 2023), winter semester 2023 (late January 2024), summer semester 2024 (early July 2024) and winter semester 2024 (late January 2025). This design is the best approach to ensuring that as many of the participants who attended the B.A. module in either 2021 or 2022 as possible continue participating in the data collection process across their entire teacher education programme. For the data analysis procedures that follow, an anonymised code was self-generated by the participants within the questionnaire, enabling us to observe which participants were actually observed longitudinally throughout the course of the study.

As described above, not every research instrument is used at every measurement point. Given that the development of affective-motivational teacher competence is core to the research project, the beliefs instrument is employed for every measurement. Also, sociodemographic variables are part of the questionnaire at all of the four measurements. Moreover, at every measurement point, participants are given questions about the module design and their expectations as well as satisfaction with regard to the ways the modules on multilingualism are delivered. Questions concerning the offering and usage of relevant OTL only become important later in the teacher professionalisation process as it would be unlikely to have sufficient variance when using such questionnaires early during the study phase. Therefore, the OTL questionnaire is only used for t_3 and t_4 . To gain further insights into the cognitive competence, and also to gain findings regarding the effectiveness of the undergraduate module, participants are given the self-designed knowledge test at t_3 only. For various reasons (feasibility, time to take the test, time to rate the test, decrease of willingness to participate in a study, etc.), the knowledge test was limited to testing some declarative knowledge, that students are expected to acquire during their B.A. module. It can thus only be seen as a proxy measure of actual cognitive competence of pre-service teachers in the area of catering for

multilingual learners. Table 1 provides an overview of the measurement points and the research instruments employed at each point.

Table 1: Measurement points and research instruments

	Sociodem. Data	Evaluation	Beliefs	Knowledge	OTL
t ₁	✓	✓	✓		
t ₂	✓	✓	✓		
t ₃	✓	✓	✓	✓	✓
t ₄	✓	✓	✓		✓

Discussion

The complex data collection described above will undoubtedly contribute to a better understanding of pre-service teachers' affective-motivational competence development in the area of multilingualism and complements the knowledge gained from previous studies (Ehmke & Lemmrich, 2018; Fischer, 2018; Fives & Buehl, 2012, 2016; Maak et al., 2015; Neokleous & Karpava, 2023; Paetsch et al., 2023). Based on the descriptions of the methodological design and data collection presented above, this section now addresses the methodological considerations with regard to the choice and the composition of the instruments. In order to exemplify the potential benefits of creating a better understanding of pre-service teacher competence development (with regard to catering for the needs of multilingual learners), the study's overall approach is discussed through a methodological lens. We argue that what is unique and innovative about the study is the combination of (pre-existing as well as newly developed) instruments in the context of pre-service teachers' competence of multilingualism.

Methodological reflections: expected outcomes and impact

To our knowledge, there has been no study that systematically surveys teachers' beliefs about multilingualism in a longitudinal design. This section reflects on the methodological design, and indicates the potential outcomes and impact of the study presented here. Given the usage of individual yet anonymised codes (generated from the sociodemographic data collected at each measurement point), the knowledge proxy measure that is only applied at t₃, can help to better understand the interdependence between cognitive and affective-motivational competence. As highlighted in previous studies (Hammer et al., 2016; Schroedler & Fischer, 2020) it is not uncommon that pre-service teachers tend to have rather high affective-motivational competence, but lack cognitive competence in dealing with multilingual learners. The study at hand can help to systematically explain this beliefs-knowledge gap. The rich sociodemographic background data will help to explain the structurality of teachers' beliefs about multilingualism, and will allow for precise analyses regarding the interdependence of personal backgrounds and competence development. In terms of social and linguistic

diversity, the sociodemographic data collected in this study differs substantially from most comparable studies, such as Paetsch et al. (2023) or Schroedler and Fischer (2020). This variation mainly originates from different regions' (states') societal and linguistic textures. The regional context in the Ruhr Area of North-Rhine-Westphalia represents a unique environment for teacher students due to its long history of migration, and, thus, an enormously linguistically diverse environment. A considerable proportion of participating pre-service teachers (around 62%) grew up with a home language other than German themselves, and are thus multilingual (see Schroedler et al., 2023b, 16). As alluded to above, this creates a fundamentally different starting point for this study compared to other studies from Germany. Not only the personal circumstances (multilingual upbringing) of the participating pre-service teachers, but also the regional and therefore societal multilingual environment of the university as the research setting arguably has an impact on the study's outcome. While not all relevant studies report their samples' background data, it can be assumed that the linguistically highly diverse environment of the Ruhr-Area has an impact both on the sample of pre-service teachers but also on the general context of teacher education and OTL for pre-service teachers. It is hence possible using the study's data to compare rather substantial groups of participants with own multilingual biographies to sub-samples who grew up speaking the majority language only.

Studies from other national contexts such as Schmidt et al. (2011) with reference to the USA suggest that there are substantial differences in OTL depending on different universities within the country and that these differences can affect outcomes of pre-service teachers' competences. This would further underline the need to create and compare data from different contexts within Germany which seems important regarding the aforementioned differences in teacher education between different states (Berkel-Otto et al., 2021). These federal regulations create different framework conditions for research in teacher education in Germany relating to multilingualism. For example, researching at a university in North Rhine-Westphalia means that all participating students are taking a mandatory module on GSL as part of their general teacher education curriculum. Paetsch, Heppt, and Meyer work within a federal state that does not have mandatory OTL. They point out the need for research in different contexts (2023, p.11), which this study can connect to.

The OTL measurement will enhance the analyses with regard to examining interdependences between engaging with relevant topics during one's course programme and competence development. Moreover, it will be possible to explore the OTL data in their relation to both the module content as well as to the knowledge test results in order to determine whether the module's intended curriculum, the participants' competence, and their perceptions regarding the study components (OTL) are (to some extent) in conformity (König et al., 2017; McDonnell, 1995). Beyond this, the analyses will help the project's institute to evaluate the curriculum design of the two compulsory modules on multilingualism. This can be extended to comparing the OTL results gained in this study to studies that have used the identical instrument in

other research contexts (Ehmke & Lemmrich, 2018). Gaining profound analyses with regard to the prominence of singular components in the curriculum in comparison to other teacher education programmes will be an important contribution of this study. In addition, the general framework conditions of the cohort and the regional context might offer more and possibly different OTL with regard to engaging with multilingual learner populations given the high proportion of multilingualism in the Ruhr Area (e.g. cooperation with schools and other educational institutions, more multilingual students, more discourse at university).

Another unique feature of the current study is that although research of this kind (especially with regard to teachers' beliefs about multilingualism) has become a hugely prominent field in Germany and beyond over the last decade or so, as alluded to further above no study to date has attempted to systematically track this type of competence development in a longitudinal design. Therefore, the data collection at hand provides the opportunity to generate an actual longitudinal profile of pre-service teachers over a longer time span, to observe the complexity of recreating the real development through traceability, and to apply a complex composition of several measurement instruments at different times, balancing ethics, efficiency, relevant components for teacher students' beliefs and its affecting areas of competence. The potential of the data set is hence tremendous when considering the various types of analytical statistical procedures that can be carried out using this data. Beyond descriptive and various forms of bivariate data analysis, the data set allows for different regression models as well as meaningful structural equation modelling.

Finally, all participating pre-service teachers at the university undergo the same standardised compulsory programme on GSL. The programme can thus be understood as a coherent basis for the participants' competence acquisition. Observing two full cohorts of pre-service teachers hence creates a database that can be considered representative for even larger groups, including the adjacent programmes for primary and high school pre-service teachers.

Limitations

While the methodological design of the project presented here bears high potential for findings related to the professionalisation process of pre-service teachers in the area of their preparation for multilingual classroom settings, a critical reflection of the research methodology and the study's limitations is in order. Research that uses Likert-scale type responses of agreement to certain statements (as is employed here for the teachers' beliefs instrument) is often confronted with social desirability issues. Given that participants are sampled through modules they attend on the topic of multilingualism, they might be inclined to indicate welcoming beliefs towards multilingualism. This is one of several issues in larger quantitative research studies, such as the one described here, that yet has to be resolved. With regard to observing the OTL used during the teacher training programme, it has to be clarified that the 24 items used may not cover each and every relevant topic for a *good* professionalisation process in the field of multilingualism. Also, the way the scaling works for the two scales covering the OTL, it is so far unclear whether distribution and variance will be

meaningful in the analyses. Lastly, the knowledge test, as indicated above, is a self-designed short instrument covering declarative knowledge conveyed in the B.A. module at the university where the research is conducted. It has not been piloted or validated, and can by no means cover all relevant facets of cognitive competence in the area of teacher professionalisation for multilingual classroom settings. It thus remains a proxy measure of the students' memory with regard to what they learned one or two years prior to taking the test in the study presented here.

Conclusion and recommendations

As described in the previous sections, the data collection for the evaluation project is still ongoing. The results of the first cohort and their pre-post measurement of teacher beliefs during their B.A. module (t_1 and t_2) has been published (Schroedler et al. 2023b) and provides interesting insights into the development and structurality of the aforementioned beliefs. The results show that beliefs improve significantly on each individual scale. Moreover, it can be seen that pre-service teachers, who have multilingual biographies hold different beliefs about multilingualism compared to the monolingual peers. Further descriptive and very preliminary results indicate that the increase in the beliefs measurement continues steadily from t_1 to t_2 to t_3 to t_4 . So far, no advanced multivariate or inferential statistics can be performed on the dataset. As for the next steps in the research process, data collection needs to be completed, before all data (from each measurement point) can be merged and prepared for advanced analyses.

Conflict of interests

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