

# On a math mission: The time and space compression of professional identity and values in prospective mathematics teachers' stories

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**Hege Marie Mandt**   
Østfold University College, Norway

**Geir Afdal**

MF Norwegian School of Theology, Religion and Society, Norway; Østfold University College, Norway

## Abstract

This article analyzes and discusses the professional values of prospective mathematics teachers. Theoretical approaches to the understanding of teachers' professional values, such as critical mathematics education and relational perspectives, are well developed. Still, there are few empirical contributions to the field. Here, professional values are understood as interwoven with professional identity. The article raises the question of how prospective teachers construct their identity and values in time and space, and the analysis is based on data material from mathematics teacher students at two Norwegian teacher education institutions. The main finding is that the teacher students construct their professional identity and values in a compressed timespace. Their professional responsibility is located in and restricted to themselves and the relation to the individual student, not including concern for, for instance, social justice. The students do not express opposition to ideals of social justice, but it is beyond their constructed professional timespace identity, values and responsibility.

## Keywords

Professional identity and values, responsibility, timespace, prospective mathematics teacher, interpretive phenomenological analysis

## Introduction

This is a study of the scope of professional values among prospective mathematics teachers in Norway. Professional values are constitutive of teachers' professional practice (Bullough, 2011;

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### Corresponding author:

Hege Marie Mandt, Østfold University College, Postboks 700, Halden, 1757, Norway.

Email: [hege.m.mandt@hiof.no](mailto:hege.m.mandt@hiof.no)

Hansen, 2001), including mathematics education (Boylan, 2016). In this article, we understand the value-aspect of teaching and education as involving questions of what is valuable and worthwhile; that is, of what is good for and within social practices, societies and individuals. Professional values concern issues of what is worthwhile and good for a collective profession and individual professionals.

In both educational and mathematics educational theory, there is an extensive body of contributions to the understanding of the values of social justice (Cochran-Smith et al., 2009), equity (Atweh, 2011) and democracy (Yeh, 2018) in education. One important and valuable approach is critical mathematics education, emphasizing issues of power, political interests, gender, ethnicity, socio-economic distribution and the reproduction of social class (Skovmose and Borba, 2004). This approach is related to critical perspectives in education in general, such as social justice in teacher education (Cochran-Smith, 2010). There are other approaches to professional values in mathematics teaching and teacher education – for example, relational approaches (Boylan, 2016) and identity approaches (De Freitas, 2008).

Teacher education is a key socializing arena for professional values. Despite the many and valuable theoretical approaches, there is a lack of empirical knowledge on the role of professional values in teacher education (Maxwell and Schwimmer, 2016; Willemse et al., 2008). This paper contributes to the understanding of how prospective teachers negotiate and construct their professional values. This means that our interest is not the teaching of professional values in teacher education, nor the outcome of such teaching. We assume that prospective teachers negotiate different value experiences – for instance, from their early and late education, their family and their own practice of teaching in teacher education. Through teacher education and teaching practice, they are socialized into collective professional values, but this is not a mechanical process. Our perspective is that individual teachers are negotiating their professional values as an aspect of their identity. Values and identity are deeply connected, for example, in the concept of a ‘good teacher’ (Mausethagen, 2013). Values are not cognitive entities but aspects of who I am and would like to be. Identity is understood as relational, as being extended to other people and communities – in time and space (Ricoeur, 1992). We therefore analyze how the students’ professional identity and values are extended and constructed in time and space.

This means that our interest is not particular values or value content but how professional values work in a professional space and a professional time. Professional space and time can be understood not only as objective and given, but also as constructed and produced by teachers. The creation of teachers’ professional identity in time and space constitutes the temporality and spatiality of their professional values (Schatzki, 2010). Using the perspectives of Ricoeur (1992) and Schatzki (2010), we understand identity as a narrative process and as constituted by the process of valuing.

We have limited our research to prospective mathematics teachers in two Norwegian teacher education institutions. Mathematics is a key discipline in Norwegian educational policy and teacher education. There is also an active discussion about professional values in mathematics education, such as how to connect mathematics to society and everyday life and what kind of society and reality is created in the classroom (Boylan, 2016; Jurdak et al., 2016). Another relevant discussion concerns the relationship between neoliberal accountability policies, democracy, and the purpose of mathematics education (Valero, 2017).

For several reasons, it is interesting to study teacher identity and values in Norway. Since early 2000, Norway has implemented a moderate neoliberal accountability policy for the education system (Hatch, 2013; Mausethagen, 2013). The neoliberal values of achievement, individual choice, and performativity have been balanced with the concerns from the traditional welfare state and social democratic values of equality, collective solidarity, and care (Aasen, 2007a, 2007b). Studies of hybrid and complex cases, such as Norway, can enable more nuanced answers to the question of

how groups of teachers negotiate their identity and values in situations of increased measurement and competition.

To analyze prospective mathematics teachers' personal experiences, we used interpretive phenomenological analysis (IPA) (Smith et al., 2009). IPA and its focus on interpreting individuals' experiences have had consequences for sampling, methods and analysis. We conducted narrative, in-depth interviews with 10 prospective middle and secondary mathematics teachers at two different university colleges in Norway; their answers were analyzed in detail to assess their interpretations as well as their understanding and negotiation of political and social contexts.

Based on this process, we posed the following question: How do prospective mathematics teachers construct their professional identity in time and space, and how does their identity construction frame their professional values?

The remainder of the paper is organized as follows. The next section discusses the relevant literature and theoretical perspectives. This is followed by a section on research strategy and methods. The analysis and findings section then follows before we discuss how our findings contribute to the existing literature.

## **Situating the research**

### *Norway*

Norwegian teacher education is characterized by a mix of traditional social democratic ideals and more current neoliberal, outcome-based ideologies and policies. Norway is therefore an interesting case in the sense of a value-dynamics between two different political and educational ideologies. Norway's social democratic ideology and welfare model can be traced back to the decades after the Second World War. Values based on the vision of an equal society and a description of the common good have shaped Norwegian curricula (Telhaug et al., 2006). During the last two decades, market-liberal ideology has influenced educational policy in Norway and currently dominates today's educational reforms. This has led to diverse ideological views with different educational perspectives on what should form the knowledge base for education policy and practice. This ideological conflict constitutes a dilemma between conflicting expectations and values about what kind of society to have, what kind of education to have, and how to achieve equity and quality (Hatch, 2013).

Even though outcome-based educational policies are shaped and propelled by international actors such as the Organisation for Economic Co-operation and Development (OECD) and the World Bank, they are negotiated and enacted in different ways at national and local levels (Aasen, 2007b; Ball et al., 2012). There are reasons to believe that accountability processes take different shapes in different countries (e.g. Norway versus England) and that the processes involved in teacher education are different from those used in primary and secondary education.

## **Critical and relational approaches to mathematics education**

In the discussion of professional values in mathematics education, the critical and relational approaches are both interesting and valuable.

De Freitas argues that critical mathematics education

is an attempt to reconceive school mathematics as a site of political power, ethical contestation, and moral outrage. Critical mathematics education refers to a set of concerns or principles that function as catalysts for re-conceiving and redesigning the lived experience of school mathematics. These concerns or principles are meant to target issues of political agency in society through an examination of mathematics education. (2008: 80)

Mathematics education is not seen as abstract practices, as the learning of skills and procedures that can be applied to real life. In mathematics education, knowledge and skills should be interwoven with mathematics in everyday life. Furthermore, everyday life should be not taken for granted as a given and neutral reality. The social world in the mathematics classroom should explore what could be (Skovmose and Borda, 2004). Mathematics education involves issues of criticism of the current ideals that education strives for. The ideals of social justice – of justice concerning socio-economic position, gender and ethnicity – are crucial.

This means that mathematics education is stretched in time and space. It is stretched to the past in terms of the analysis of causes for injustice; it is stretched to the future in terms of ideals of a better society. The classroom is also stretched – to the local, national and global society and to nature and environmental concerns. This will in turn affect the teacher's and prospective teacher's professional identity and values. The teacher needs to stretch education in all these ways.

In mathematics education research, different perspectives have been embraced to study and understand issues of equity and quality within the field (Jurdač et al., 2016). The western capitalist ideological rhetoric that 'mathematics is for all' has for three decades been dominant, and identity research has highlighted the socio-cultural, ethnic and gender-based differences and injustices present in mathematics teaching practices (Berry, 2008; Gutstein, 2009; Martin, 2010; Stinson and Bullock, 2012; Valero, 2017; Walshaw, 2001). As Valero (2017) points out, 'the urge for *math for all* has become a naturalized truth; a desire that navigates in society,' which is rarely discussed (117; original emphasis).

A relational approach to mathematics education is argued by Boylan (2016). He identifies the following four different value-relations for the mathematics teacher: the relationship with others, the societal and cultural, the ecological, and the relationship with self. In this way, Boylan expands the value-dimension from a matter of social justice also to care for students, colleagues and parents; to environmental concerns; and to self-care and passion. In this context, it is interesting to note that even though Boylan is locating values in the teacher and the proximate relations in the classroom, education and the understanding of the teacher's professional identity and values are stretched in time and space.

In empirical studies of mathematics teachers' professional identity, the individual's perception as a caretaker is fundamental to the desire to become a teacher (Van Putten et al., 2014). Studies have indicated that teachers value students' wellbeing above policy changes and reforms (Ballet et al., 2006). However, new teachers show a commitment to social justice at the individual level rather than at the macro level (Cochran-Smith et al., 2009). Van Putten et al.'s (2014) research on prospective mathematics teachers' professional identity showed that their personal narratives seemed to be more idealistic than real. Other research has shown that prospective secondary mathematics teachers reveal an unwillingness to acknowledge the connection between mathematics and social justice (De Freitas, 2008).

## **Timespace and professional values**

There are few studies dealing with how teachers and prospective teachers develop professional identity and values in time and space. Oolbakkink-Marchand et al. (2017) investigated how teachers in Norway, Israel and the Netherlands understand and develop their agency within their perceived professional space. They found the following two trajectories of how teachers develop their agency over time: 'bounded agency' and 'contested agency'. Both trajectories negotiate an objective and given space, but the latter is characterized by teachers who act more on 'personal pedagogical beliefs'. In this study, we share this interest in professional space, but we are investigating

specifically how prospective teachers produce time and space in their stories and how timespace constitutes professional values.

## Theoretical framework

Being interested in the personal experiences of prospective mathematics teachers, we chose a broad and open theoretical framework. We find Paul Ricoeur's (1992) theory of identity and values in his book *Oneself as Another* fruitful in the context of this study. He understands identity as interwoven with values and ethics; that is, who I am cannot be separated from whom I might become and want to be. Furthermore, he created a dynamic understanding of identity in the form of narrative identity, conceiving identity as being simultaneously self-oriented and other-oriented. Ricoeur's (1992) conception of values and ethics is also broad and dynamic, combining theories of character and goodness with theories of justice and rightness. He thereby opens up the value-aspect of teacher professionalism. Values may be understood as universal principles, such as social justice, but they may also be personal conceptions of what is good (e.g. how prospective teachers have experienced and imagine a good mathematics teacher).

Through the concept of narrative identity, Ricoeur (1992) enabled an understanding of identity that is performative, changing and in process, thus creating permanence in time and space while preventing the dissolution of self. Furthermore, the conception of narrative identity holds together an identity in time in that it is a story of who one was, is and wants to be. Time is important, and the present story of 'who I am' draws on past experiences and imaginings of the future.

Ricoeur's (1992) theory of narrative identity also involves space, at least implicitly. He combined the idea of the free-floating self with the structurally determined self. The story of 'me' involves others in a strong sense – 'I' cannot 'tell me' without 'the other'. This means that in the narrative 'oneself as another', the space of the professional teacher is not confined to the atomist individual. At the same time, however, the story is told by an active, telling 'I' and is told in different ways. It is an empirical question as to how teachers create their professional space. The question is who and what is a part of their professional space – what is the extension and character of the space they construct?

Schatzki's (2010) theory of 'timespace activity' elaborated the conception of time and space as something that is produced rather than simply given (see also Harvey, 1990; Lefebvre, 1991). Schatzki (2010) argued that timespace activity is different from both objective and subjective time and space. Both time and space are produced in social activity and cannot be understood as objective entities independent of human practices; nor should time and space be understood as subjectively positioned within objective given time and space. This means that in teacher practices, normative political and social regulations and aims cannot be understood as given, objective and prior frames and restrictions of a subjective professional space. Regulations and aims must be investigated empirically as they have a role and value in the everyday social practices of teachers. The character and extension of both time and space are produced through and in social practices. Time is not understood sequentially; the past and the future are interwoven in the present in different ways; nor is space separate from human action and activity – it is enacted, made and produced.

Schatzki (2010) argued that time and space are entangled in social practices. All social practices have drives and ends; that is, a teleoaffective structure. This teleoaffective structure constitutes and connects spatiality and temporality. The concept of teleoaffectivity indicates that social activities have ends and drives and that the ends and drives have an affective character, involving the identity of the social practice and its individual participants.

In sum, Ricoeur (1992) gave us a theoretical framework that interweaves professional values and professional identity, which means that we search for professional values by analyzing prospective teachers' professional identity. Ricoeur (1992) also emphasized that identity should be understood narratively, meaning that we analyze how professional identity is constructed in the everyday stories of prospective teachers. We relied on Schatzki (2010) to elaborate on the understanding of time and space and how professional identity and professional values are temporally and spatially constituted. Schatzki (2010) argued that time and space can be understood as products, not only as objective entities, and that the production of time and space is not individual and cognitive but is created in social interaction and practices.

## **Research approach**

To understand how prospective teachers are negotiating their professional identity and values in time and space, personal narratives and experiences are essential. We chose the IPA research approach, which recommends a detailed analysis of the personal stories and experiences of a few informants. IPA emphasizes in-depth insight into the individual's internal world and their subjectively felt experiences of meaning. Meaning and experience are closely linked in the understanding of the human being as a sense-making being. This approach is concerned with examining how people make sense of their experience (Smith et al., 2009). Our use of IPA does not imply an atomist social ontology. We understand professional values as aspects of collective professional practices. But we also assume that individual teachers negotiate different values from a variety of experiences in their making of teacher identity, and we consider IPA to be a fruitful approach to analyzing the character of these individual negotiations and constructions.

To establish a conceptual understanding of identity, values, time and space, we combined IPA with Ricoeur's and Schatzki's theories.

## **Context and participants**

The research design influenced the data collection. IPA emphasizes an idiographic stance. Researching personal experiences, a limited number of participants were recruited. In-depth stories from 10 prospective mathematics teachers from 2 different university colleges in Norway were collected during spring 2017. The teacher education program in Norway is a general education program for upper primary and lower secondary. Mathematics is an optional subject, and the participants voluntarily chose to specialize in mathematics.

Participants volunteered to take part in this study. They were a rather homogeneous group, which may be due to voluntary recruitment (Patton, 2002). The 10 participants consisted mostly of older and mature students. Many of them had other university degrees from before, and some were parents with experiences of teaching from a parenting perspective. The participants were in their third year of a four-year teacher education program. The participants had completed their two teaching-practice periods, where the first consisted of observation and some teaching, and the second lasted four weeks with full responsibility for the class.

## **Interviews**

To recruit participants for this study, two teacher educators at the university colleges distributed a written explanation of what the research entailed, how the data would be used, and how and to whom it would be reported. Participants contacted the researcher directly, and the teacher educators did not know who else was participating. The participants were given confirmation of

confidentiality and could withdraw from the research at any time. The participants did not know the researchers. There were no relations between the interviewees and interviewers. The participants were aware that after completing the interview, there would be no interaction between the researchers and the participant in their completion of their education.

We used an open-ended, semi-structured interview format to establish an atmosphere of openness and enable a conversation of subjects and questions relevant to the participants' experiences. To achieve a dynamic interview situation where the participants told their stories, they were encouraged to guide the interview, to share their story and experiences, and to highlight subjects that were important to them. The researcher then had the opportunity to follow up on the subjects the participants highlighted, which sometimes led to a natural conversation (Smith et al., 2009). We asked questions such as: 'Do you have any thoughts about what kind of math teacher you want to be?' This kind of question would make it possible for the participants to talk about events and experiences that were important to them. All interviews were audio-recorded and transcribed verbatim. Each interview lasted approximately 90 minutes.

## Analysis

The analytical process involved different layers of experiences and interpretations. By using IPA, we seek to understand the participants' point of view and intended meaning. The researcher operates at a level that is grounded in the text but also moves beyond the text to a more interpretative level. This again includes several levels of analysis (Smith et al., 2009).

First, each transcript was coded in full using NVivo to maintain an idiographic stance. Then the transcripts were inductively analyzed. This allowed for the experiences of each participant to be reflected in their entirety, developing emergent themes for each individual case. In this first phase, the transcripts were read several times. Foundation and grounding in examples were followed to maximize validity (Smith and Osborn, 2003; Smith et al., 2009). Then we performed a cross-case analysis of emergent themes, searching for resemblances, variations and relationships (Smith et al., 2009). This strategy enabled us to move from the particular to the shared. Finally, we used an abductive approach to look for the dialectical relationship between the data and the theoretical framework. In the final stage of analysis, we assessed key aspects of Ricoeur's (1992) theory of identity through a process of constant comparison between the transcripts and emergent themes. Having discovered the participants' compressed identity around time and space, we relied on Schatzki (2010) to comprehensively analyze how the participants' professional identity and professional values were temporally and spatially created.

The analysis of participant narratives revealed that they shared the same codes on professional identity and professional values. We took a closer look at this and re-analyzed their narratives of past, present and future self. In the participants' stories of shared values and identity about their profession, we found common boundaries related to their compression in time and space. Below, we will describe the evolution of the analysis.

The findings are presented in two stages. This first stage illustrates the phase of the individual analysis. In doing this, we use examples from two of the participants, whom we have given the pseudonyms Alice and Brenda. Then, in the second stage, common meanings are explained using theoretical concepts from Ricoeur (1992) as sensitizing devices. Alice and Brenda narrate the shared themes in a particularly rich way, which is why these two are used as examples.

Our sample is strategically limited to prospective mathematics teachers at two teacher education colleges in Norway. Our ambition is not to make empirical claims about teachers in general but to analyze the construction of professional identity and values in these prospective teachers'

narratives. Based on our findings, we argue for a contribution to the theoretical understanding of professional identity and values.

## Introducing Alice and Brenda

Alice and Brenda share a strong desire to become mathematics teachers and express eagerness for their future jobs. Both are conscious of their choice to become mathematics teachers. They have additional education degrees and job experience from before they began studying to become mathematics teachers. Brenda is a qualified biologist and also specializes in chemistry, while Alice was previously educated in the field of sports and worked as a personal trainer for eight years before deciding to become a mathematics teacher.

### Brenda's story

My motto is that mathematics is for everyone. I have experienced so many students giving up in the sixth grade. You cannot give up your math then. Or in seventh grade. They are 12 years old, and they have it absolutely terrible because these numbers destroy their life. . . . I think my calling in mathematics education is to make people master the subject.

Brenda's motto is 'mathematics is for everyone'. This motto runs through Brenda's story and is key to her understanding of her identity as a prospective teacher. We understand her use of the concept of a motto as a strong statement or credo. The credo is a short expression for what she finds valuable in being a mathematics teacher and has significant consequences for how she negotiates her professional identity. All of the prospective teachers we interviewed subscribed to the credo 'mathematics is for everyone' in one way or another.

Brenda frequently used the concepts 'calling' and 'mission' when talking about becoming a mathematics teacher and her professional role and identity. She described her responsibility as to change the experiences for students in mathematics, to allow them to explore the opposite of what she herself experienced:

That's why I'm studying to be a math teacher now, to change it: To become a better math teacher than I experienced as a student. . . . I think my mission in becoming a mathematics teacher is to make students master the subject.

Brenda related her future job as a mathematics teacher as a mission and vision. She talked about her future job as something bigger and more than just a job: she wants to make a difference; she wants to make a change. The concepts of mission and calling often have religious connotations; however, Brenda did not make the religious connotations explicit, nor did she seem to have a religious motivation for her professional choice and understanding of her identity. Nevertheless, the religious connotation makes sense to an extent, even in this secular context. 'Mission' implies having a message, bearing 'good news', and a strong belief in the importance of a message or credo. Being on a mission means to work for change in people and institutions according to the direction of the message; it also implies the idea of a radical change from bad to good. 'Calling' does not mean having a divine calling, but it does underscore the seriousness and responsibility of being a teacher. Brenda wants to make a difference in teaching so that all students can learn mathematics, master the subject and not give up.

The mission 'mathematics is for everyone' is a driving force and a deeply situated aim in her professional identity. It gives direction to who she is and what she wants to do as a teacher, but it



is not only future-directed. The mission is integral to her present professional identity. Brenda also talks about her mission in emotionally laden ways, indicating that it is strongly affective. The mission 'mathematics is for everyone' can be understood as a teleoaffective structure and the affective, unifying drive and end (Schatzki, 2010) of Brenda's professional identity as a teacher.

Time is important in the construction of Brenda's professional identity. Her past and her experiences as a student are vital:

I have experienced being seen in the classroom as a student, I have also experienced not being seen. In the last year in the middle of secondary school, for example, I was very bored in my math classes because I was one of the best in the class, and I did not get enough challenges. So yes, I got the top score on all the tests and went out with top marks in the grade book, but I had not been seen. So those grades were not fun because I had not been seen. There were not good math lessons. So that's an experience.

In relating her own experiences as a student and taking a student's perspective, Brenda established 'being seen' as a criterion for the quality of teaching. In light of the current educational emphasis on outcomes, this is somewhat surprising. The logic of accountability policies is that good teaching is exemplified by good scores. Even though Brenda achieved top scores, she thought of her experience as a student as an example of bad teaching because she was bored and not challenged. To Brenda, it seemed as though individualized teaching has value in itself; she did not understand individualized learning as an instrument or a method for improving outcomes. Brenda's mission is not related to the outcome. In fact, it is worth noting that she does not reflect on the pressure related to results and competition at all. Her focus is the classroom, understood as the individual student, her relationship to mathematics, and to become a perceptive and facilitating teacher. Time here is related to space. The bad experiences of the past and the downplaying of the importance of future results leads to an emphasis on the present individual and intimate space between the teacher and each individual student. Brenda also elaborates on the encounter with traditional teaching in today's mathematics teaching. Brenda has an egocentric expression of her own experiences of the past. However, she also expresses that present experiences of traditional teaching do not consider the facilitation of each student and fail to achieve that 'math is for everyone'.

Brenda related the motto 'mathematics is for everyone' to teaching methodology as she strongly believes that if a teacher manages to adapt his or her teaching to each student's learning level and needs, those students will be able to learn the subject. For her, it seems as though this is the ethically correct way to be a teacher. This conception has further ethical implications. Individualized teaching implies seeing all students and facilitating learning for all the students, as she claimed in the interview. In Brenda's story, 'seeing' represents an aspect of caring; she does not want her students to give up or to let the subject make them feel bad.

The intense focus on the individual student and Brenda's relation to mathematics and the teacher also means that wider relational and societal aspects are not included in the story of good mathematics teaching and teachers. Good teaching is an individualized methodology, not developing relational learning or understanding mathematics education as a contribution to a more just and democratic society.

Brenda's inspiration in becoming a 'good' mathematics teacher also seems to be related to teacher education: 'It was really WOW! I did not expect that. So, (the teacher educators) have really inspired me to engage in mathematics teaching and become proficient in teaching and convincing students that math is fun.' Mathematics teaching in teacher education became a 'wow' experience for Brenda and was an affective, major turning point for her in the belief that 'math can be fun and for everyone'. This turning point creates a meaning of time in Brenda's story. Her past egocentric experiences are filled with experiences of traditional, bad teaching and bad teachers,

while the present teacher education is the turning point, opening up a future with good, reform-oriented teaching and good teachers.

So how is Brenda constructing her professional identity in time and space? There is no continuity with the past in her professional identity; the traditional mathematics teacher is only a negation. The future holds hope for new teaching in mathematics, and yet the perspective of the mathematics teacher is not the future of the student, his or her results, or a better society. The future is here and now in the sense that a new way of teaching can be realized in the present. Space is also located in the here and now. The primary professional space is the space between the teacher and the individual student.

## **Alice's story**

We have a fifth grader at home, and I see what she has in her math book. That is what students struggle with in the ninth grade. There were many students in ninth grade who did not understand math topics at a fifth-grade level. I am sad when I see that they do not understand math and that they are struggling. Many students just give up. I understand that some of them are struggling – I have been there myself. But it is possible to master at their level!

Alice has the same professional credo and mission as Brenda: mathematics is possible to master at any level; mathematics is for all. The problem is not mathematics, educational policy or economic conditions. The reason students struggle is because of how mathematics is taught. Alice conceives of the teaching of mathematics in dichotomous terms, as traditional versus reform education. This relates to Brenda's dichotomy between the bad past of traditional teaching and the possible bright future of reformed teaching:

Things I've seen in teacher practice; it is traditional teaching, and no one checks whether the students understand (what is being taught). There is so much wrong. Where should you start when you are out in school? With this traditional teaching, I get frustrated because I see that 20 percent may be involved, and the others do not understand.

In Alice's story, we get an elaboration of how the dichotomy between traditional and reformed teaching constitutes an intimate, professional space. Alice claims that one of the problems with traditional teaching is its lack of attention to the students' learning process; the main focus is on teaching, not on how each individual student learns. This, she says, leads to injustice; only a minority is involved and benefits from the teaching in mathematics. Traditional teaching is not only unjust, but it is also 'so much wrong' – concerning designing mathematics classes that function for all or most students. It is worth noting that Alice expresses frustration when she mentions traditional teaching. She is emotionally involved in the 'mission' of new teachers: to change traditional teaching to reform education in mathematics. This change may be understood as a natural consequence of Alice's teleoaffective structure – the affective, unifying drive and end – of her professional identity that mathematics is for all. In other words, reform education is the way mathematics is made possible for all.

Alice elaborated on what is wrong with traditional teaching in mathematics:

Perhaps it may be with the contact with the students and how to teach and the type of teaching. What I have seen in practice is traditional teaching, tablet teaching, then we do some tasks. They also have a work plan to be done.

According to Alice, traditional teaching has three elements. First, the teacher presents a topic using the blackboard and giving a short lecture. Second, the students solve a number of assigned tasks. Third, the students are given a work schedule. Mathematics teaching is standardized; there is no communication with individual students or an adaptation of teaching to individual learning processes.

Alice's hope for mathematics teaching is to reform education. She explains her experiences with reform education within teacher education as a form of teaching that includes communication with the individual student, a focus on understanding, active learning, critical analysis, and different strategies for solving problems. It is a type of mathematics that starts in the practical and everyday life of the students to create abstractions from the concrete. Alice talks about this way of teaching with great enthusiasm, saying that it energizes the students, giving rise to creative, engaged and individualized learning in the midst of chaos.

It is worth noting that in Alice's story, mathematics is framed as an intrinsic good for everyone. The problems are not due to mathematics as an academic discipline, nor to political frames and regulations; the sole problem is the methodology of teaching. As with Brenda, Alice's hope and values are invested in students as individuals and individualized learning, not in how mathematics can contribute to a better or more just and democratic classroom or society.

Reform education and individualized learning produce a professional space similar to that in Brenda's story. The primary space lies between the mathematics teacher and the individual student. Teachers are trained to be seeing and caring professionals who understand the motivational and epistemic conditions of individual students and can adapt their mathematical skills and knowledge accordingly. The individual teacher–student relationship, however, is not symmetric when it comes to responsibility. Alice placed responsibility for that solely on the teacher:

Because I think all the teachers really know what's best to do. What will work best, for basic understanding and understanding the subject, but that they . . . I do not know why they do not work more with it. Whether it is too demanding in relation to pre- and post-work. It is a bit sensitive to ask our teacher from practice about it: 'why do you not do a better job?' . . . I do not know if you can call it being lazy in a way. I think they're just a little 'leisurely.' It is certainly very easy for the individual teacher with traditional teaching, but it is so incredibly bad for the students.

Like the other participants in our interviews, Alice identified the teacher's approach as the main cause of the problematic transition from traditional to reform teaching. The problem is not policy, school organization, economy, research, structure, unions, students, family or culture. This may be interpreted as an even more delimited space than the teacher–student relationship. In placing the responsibility on the teacher, the professional space is limited to an individual, inner space. More specifically, the problem is teachers' professional character. Alice claimed that, in general, teachers do not lack knowledge of reform education; it is a question of character. Alice did not understand the reason for this professional behavior and implied that it is morally egoistic to choose an easy working life for oneself over the best interest of the students.

Alice is indirectly arguing for moral responsibility: mathematics teachers who choose the demanding path of reading up, preparing new and differentiated classes, and who place the best interests of their students first. In Alice's descriptions of character, she emphasized facilitating learning for all students, building up their understanding and self-esteem.

Professional time is also restricted in Alice's story. The reform teacher's professional identity does not reach into the past or the other as negation; alternatively, nor does her identity stretch into the future in the sense that reform education is yet to be developed, learned and gradually realized. Reform education is already present. There is no need for more knowledge, skills or development.

Every teacher has the necessary knowledge; it is only a question of values and choice. Professional time is concentrated in the present, in the same way that professional space is concentrated in the teacher–student relation and the inner world of the teacher.

## Shared meaning

The stories of Brenda and Alice overlap in many ways and are furthermore representative of the other participants' stories. In this section, we systematically assess the shared issues affecting this cohort. First, we discuss how professional time and professional space are produced in Brenda's and Alice's stories and how the teleoaffective structure of their professional identity connects time and space. Second, we discuss the consequences of the construction of professional identity in time and space on professional values.

The prospective teachers' stories from this study relate to experiences, hopes and valuing in time. Time is not given; stories produce and create time. Ricoeur (1992) argued that identity is best understood as a narrative about actors, actions, relations and plots in time. What happened in the past constitutes who I am, as do my hopes and ideals for the future. At the same time, the active telling of stories creates a plot and gives meaning to the identity of the prospective teachers and what they value. Schatzki (2010) argued that time is produced by action and activity. Time is woven in and through stories about actions, activities and experiences, piece by piece.

Alice and Brenda constructed their professional identity in time in similar ways. They both mentioned a radical break with the past. They did not identify with their own mathematics education and teachers – all of these experiences are classified as part of traditional mathematics education which relate negatively with their intentions. There is nothing of value in tradition. Professional identity does not extend to the past – it starts here and now.

It may seem that they are both turned toward the future, which holds hope for a better mathematics education. A closer look at their stories, however, shows that they are not very concerned about the future when they talk about mathematics education and themselves as teachers; nor do they reflect much upon the future results, life or work of the students. The future of education and society is beyond their professional horizon. They do not relate the act of teaching with ideas regarding the purpose of education or critical reflections on education and society. Their professional identity is cut off from the future in a wider sense. The future is in the present – that is, the mathematics education of the future can be done here and now. Better mathematics education is not valuable to create a better future; rather, it is valuable in itself and has a present intrinsic value.

This means that professional identity is temporally compressed. In Alice's and Brenda's stories, professional time is produced as a compressed and intense 'here and now'. Cutting off the past and adapting the future to the present prevents an understanding – and enactment – of professional identity along timelines and as a development over time. Their time horizons are shortened 'to the point where the present is all there is' (Harvey, 1990: 240).

The narratives of the prospective teachers also produce a professional space. Ricoeur (1992) argued that stories are laboratories where we create possible worlds. Through imagination, we can create different spaces – in this case, spaces for professional practice. Schatzki (2010) claimed that social space is not external to, or an independent 'frame' of, human activities but is produced in social interaction. Which space do the teachers use to create their stories? Is there a space where they can move around and where they locate themselves in professional practice? The analysis above shows that the professional space of Brenda and Alice is the proximate micro-relation to individual students. They both locate themselves in the space between an individual student and mathematics. It is in this space they can do a good job and where a good teacher should be located. Their stories are silent about other spaces, such as the wider space of the classroom, the interaction

and relational learning between students, the space of the school and the space of society. This means that this wider space is not activated as a possible professional space in their stories. The tendency is the opposite – in assigning radical responsibility to the individual and the isolated teacher, professional space is even more delimited to the individual inner sphere.

In sum, the mathematics teacher's professional identity is compressed into a micro-timespace. Being a teacher – or rather, being a good teacher – means to maneuver in a very delimited timespace of here and now and in between individual students and oneself. Brenda's and Alice's statements that 'math is for everyone' appear to be the ideal. Their narratives give the impression that it is only the teaching method that is fundamental to all learning and that the teaching methodology itself can facilitate mathematics learning for all students. These statements are also reflected in the other participants' stories. It is the participants' experiences that poor teaching styles are responsible for poor student performance. The participants do not talk about students' abilities in mathematics. They have a focus that is teacher- and teaching-centered, not student-centered. Again, the statements are compressed in a micro-timespace where the focus is on the method used by the teacher.

Schatzki (2010) argued that the teleoaffective structure of an activity binds time and space together and creates a timespace, where time is deeply connected to space and vice versa. This seems to be the case here. The teleoaffective structure of the activity in the stories of Brenda and Alice is, in short, 'mathematics is for all'. In unpacking this slogan, we argue that in their stories, mathematics is affectively and cognitively presented as an intrinsic good, independent of past and future and of the society at large. Furthermore, mathematics for all is brought to life in the form of individualized learning, which is only possible if the teacher is operating in the proximate space of the individual student. The affective aspect is vital for understanding the teleoaffective structure as a mission and vision that involves identity and value and is crucially important.

Next, we examine the implications of a compressed professional identity for professional values. In their narratives, the prospective teachers view professional responsibility primarily in relation to the individual student; classes, schools and society at large are considered secondary (if they are acknowledged at all). This, in turn, helps explain why prospective teachers place the responsibility for failure and success solely on the individual teacher. A compressed professional identity creates compressed professional values.

In his theory of identity and values, Ricoeur (1992) combined two major traditions in moral philosophy, the Aristotelian tradition of the good and the Kantian tradition of right and obligatory norms. Universal and social justice is a norm in the latter tradition. In our case, however, the universal and the social are beyond the scope of the professional timespace. Brenda and Alice transformed social justice into individual justice in the sense that individualized learning is not only effective but also morally just, while traditional education is presented as unjust as it favors a minority of the students. The prospective teachers were very concerned about Aristotelian good in the sense of the good teacher. They spoke a lot about the character of teachers and the importance of working on one's own professional values and identity, indicating that they have a very value-laden and intense moral understanding of teachers' professional identity. It is striking, however, that they never critically discussed what makes a teacher good. The good is a given; it is a part of the teleoaffective structure of their professional identity and is inherent in the combination of the intrinsic value of mathematics and individualized learning.

Another value implication is that mathematics teachers' responsibility does not extend beyond their professional timespace. The primary responsibility of the teacher is the learning process of the individual student. This responsibility is broad in the sense that it comprises seeing and caring for each student. Nevertheless, it is limited in the sense that the student, in this case, is the student here and now rather than the formation of the student in time and space. Furthermore, it involves the

isolated student, not the relationships between students in the class and at the school. It is very interesting that the prospective teachers spoke very little about classroom dynamics. The compression of professional values leaves some issues beyond the scope of the teacher, such as social justice, democratic education and the purpose of education (mathematics education in particular). The participants never mentioned democracy, solidarity or social justice at school or in society. They may have agreed that social justice and democracy are important issues, but they did not perceive them as professional issues. These issues are beyond the scope of their professional field and identity and played a small role (if any) in the activity of teaching.

The compression of professional values also means that teachers bear the sole responsibility for their students' learning. Through the production of a narrow space and the assertion that many colleagues are irresponsible, prospective teachers are taking on a huge responsibility. Their own character is critical to the success or failure of mathematics education. Value compression does not distribute responsibility for the education of students; it is intensified within an individual teacher. Moreover, radical responsibility is not imposed by an external force such as policy. In the participants' stories, radical responsibility is presented as an autonomous choice and a key aspect of the character of a good teacher.

## Concluding discussion

In this article, we have demonstrated that ethics and values played a major role in the professional identities narrated by the prospective teachers we interviewed. Ethics had a key part in Alice's and Brenda's elaborations on whom they wanted to become. They are strongly driven by the ethical responsibility inherent in their chosen profession. When talking about their future role as mathematics teachers, their statements combined the ideas of doing good and being good; they felt that what makes actions right is those actions being virtuous and good. As Van Putten's (2014) study indicated, one can argue that Alice's and Brenda's ethical views of their mathematics teachers' identity is idealistic. The argument presented in this paper, however, is not the idealist character of prospective teachers. Our argument focuses on how prospective mathematics teachers create a professional identity in time and space and on the consequences of their timespace identity for their professional values. We propose that professional identity is produced as a compressed timespace, which in turn restricts the scope of professional responsibility and values.

The argument of compressed timespace professional identity and values does not imply a development from a wider to a narrower timespace. Our research is not historical. The argument is simply that time and space could have been stretched, as it is in the approaches of critical and relational mathematics education (Boylan, 2016; De Freitas, 2008).

Our main claim has two consequences. First, social justice, as understood in critical mathematics education (Boylan, 2016), in education elsewhere (Ball et al., 2007) and in philosophy (Ricoeur, 1992), is beyond the professional timespace of these prospective teachers, and therefore it is also beyond their value-scope and professional responsibility. There is no indication that the prospective teachers are critical of social justice, and they may indeed subscribe to social justice as private people. The social is just not a part of their produced professional timespace. Justice is transformed into, and limited to, individual justice. This may explain why prospective mathematics teachers in teacher education programs where social justice is central do not enact the value in their practice (Cochran-Smith et al., 2009). They may not be opposed to social justice; it is just not a part of their produced professional reality. A stronger emphasis on social justice in teacher education may not work. The issue at stake is the enactment and understanding of prospective teachers' professional timespace.

Secondly, the data showed a strong emphasis on professional values as good (Ricoeur, 1992). The participants were concerned about being good teachers. Furthermore, the best interests and care of the student are vital. The teleoffective structure of their professional timespace, ‘mathematics is for all’, is a good that motivates and directs their practice as teachers. However, there is no trace of the discussion that the purpose of education is ‘mathematics is for all’. For example, Valero (2017) argued that the slogan is politically infused and was created to benefit national technological and economic growth. In our case, the participants understand mathematics education and individualized learning as an intrinsic and given good. The best interest of the student is individualized learning. There is no discussion of what a good life may be, how mathematics fits into and can contribute to such a life, and the role of education. Only one of Boylan’s (2016) four value-dimensions is clearly visible, the relation to self. The relation to others is reduced to the individual student. The relations to the societal and cultural and to the ecological are at best in the background. This means that the intense ethical emphasis on being a good teacher and protecting the best interest of the student does not result in criticism of educational policies. It has been argued that teachers’ concerns regarding the best interests of the student may result in their taking a critical stance toward policy standards (Ballet et al., 2006). We argue that this depends on how one construes ‘the best interests’ of the student. Our case is characterized by a combination of strong ethical professionalism and a lack of critical value discussion.


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### ORCID iD

Hege Marie Mandt  <https://orcid.org/0000-0002-9332-4738>

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### **Author biographies**

**Hege Marie Mandt** is a PhD student in mathematics education at Østfold University College, Department of Teacher Education, Norway. Her research interests are narrative identity, values and prospective mathematics teachers.

**Geir Afdal** is professor of education at MF Norwegian School of Theology, Religion and Society, Oslo, Norway. His research interests are education and values, empirical ethics, tolerance and educational policy.