

# Finding my way: a search for teacher identity

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*Ashley, a lower secondary mathematics teacher has a personal goal for professional learning: to find a teaching method that feels her own. She participates in a 1-year problem-solving intervention that aims to increase pupil thinking and engagement in mathematics classrooms. The purpose of this paper is to explore the opportunities that Ashley has, to develop her mathematics-related teacher identity within the problem-solving project. The results show that while the problem-solving intervention creates rapid change into Ashley's classroom practices, it also succeeds to influence positively the development of her mathematics-related teacher identity.*

*Keywords: professional development, teacher identity, tensions, mathematics.*

## Introduction

The descending trend of Finnish pupils' mathematics performance and interest to study mathematical sciences on a tertiary level has brought about national discussion about mathematics teaching in schools. While policymakers have slowly recognized the need to take actions to stop the alarming development, on a local level, mathematics teachers have witnessed the descending trend of pupils' performance and problem-solving skills for over a decade (cf. Vettenranta et al., 2016). The descending trend in mathematics performance, coupled with Finnish pupils' low emotions, attitudes and self-efficacy beliefs in mathematics (Metsämuuronen & Tuohilampi, 2014) challenge teachers in their everyday practices.

The needed changes in classrooms do not happen without motivated teachers. Generally, teachers who agree to participate in a professional development project can be considered as motivated to develop their teaching. However, previous studies indicate that teachers tend to receive new information as well as accept and adapt it into practice at different rate (see e.g. Laine, Näveri, Ahtee, Pehkonen & Hannula, 2018). This might be due to the different needs and goals teachers have for professional learning that also affect their openness to learn new knowledge and to adapt it into their classroom practices (Liljedahl, 2014).

This paper is about one teacher, Ashley, and her search for a mathematics-related teacher identity within a professional development project. Ashley takes part in a radical problem-solving intervention in lower secondary mathematics classrooms with four of her colleagues. All five teachers report to be highly motivated to try new methods in their mathematics classrooms (Viitala, accepted). However, they all have somewhat different goals for their professional learning within the project. While these goals in most parts are connected to enhancing pupil engagement in mathematics, one of the teachers, Ashley, emphasises also a more personal need: finding a teaching method that would become a natural part of herself (Viitala, accepted).

Ashley's personal need for the professional development project motivated me to look closer into Ashley's teacher identity and mathematics teaching within the project. I was curious of the reasons behind her feeling of incompleteness as a mathematics teacher, and how the problem-solving

intervention succeeds to answer her needs for personal development. The feeling of incompleteness as a mathematics teacher connects affect to Ashley's mathematics-related teacher identity (see Lutovac & Kaasila, 2018) that in this paper is studied through view of mathematics (Op't Eynde et al., 2002). Furthermore, the feeling of incompleteness is a strong motivational aspect for Ashley to participate in the professional development project. This emotional strain can positively impact the transition from professional learning into the mathematics classrooms (cf. Andra et al., 2019).

The purpose of this paper is to explore Ashley's mathematics-related teacher identity through her view of mathematics and changes in her teacher identity, as well as through the link between identity and teaching practices (see research themes in Lutovac & Kaasila, 2018). These issues are studied through affective lenses, that have seldom been done in the case of mathematics teachers, with an individual emphasis, a view that has often been neglected (Lutovac & Kaasila, 2018).

The paper aims to answer the following research questions: (1) *How does Ashley characterise the growth of her teacher identity over time?* (2) *What kind of tensions can be found between Ashley's experienced teacher identity and her view of good mathematics teaching?* (3) *How does the problem-solving intervention answer to Ashley's needs for professional development?*

## **Mathematics-related teacher identity**

Many review papers on identity emphasise the importance of studying teacher identity in connection to professional learning but, at the same time, highlight the vast variety of views on identity and the lack of clarity in its definitions (see e.g. Lutovac & Kaasila, 2018). This realisation stresses the importance of situating the study within the field.

Following Lutovac and Kaasila (2018), in this study, the term mathematics-related teacher identity is used to emphasise the context (mathematics) in which teacher identity is discussed. Teacher identity is understood as a dynamic construct that changes over time. It is influenced by several factors, such as prior experiences, beliefs, attitudes, emotions, work environment and colleagues, and it develops through social interactions in different contexts.

Although identity is seen as a social construct that is developed in, and influenced by different communities of practice (Wenger, 1998), identity in this paper is studied from an individual perspective (cf. Lutovac & Kaasila, 2018). This means that the discussion about Ashley's mathematics-related teacher identity is mostly guided by Ashley's thoughts and feelings about who she is as a mathematics teacher, how she describes her professional development over time, and how her affective trait (Hannula, 2012) influences her mathematics-related teacher identity.

Teachers' mathematics-related teacher identity is also influenced by tensions between experienced and ideal mathematics teaching, and between view of oneself as a mathematics teacher and view of a good mathematics teacher (cf. Beijaard, Meijer & Verloop, 2004). In this study, tensions are considered as "pairs of contrasting forces that pull a teacher in two different directions" (Andra et al., 2019, s. 3). These tensions are used to recognise the (conscious or unconscious) needs for the professional learning within the project, and together with Ashley's experiences from the project, evaluate the opportunities that the problem-solving intervention offers for professional development.

## **The problem-solving intervention**

Together with four of her colleagues, Ashley takes part in a professional development project that, by integrating collaborative problem solving into everyday mathematics activities, aims at increasing pupil thinking and engagement in mathematics classrooms. To reach sustainable change in these mathematics classrooms, the traditional teaching and learning practices as well as the physical learning environments are challenged from several fronts, and the mathematics classrooms are treated as systems (Stigler & Hiebert, 1999).

The project utilised a teaching method called building thinking classrooms (Liljedahl, 2020). The teachers implement the new teaching method in their everyday practices in mathematics classrooms. The core of the method constitutes of three activities: Every lesson starts with a problem, the pupils work in visibly random groups, and they work standing on vertical non-permanent surfaces (Liljedahl, 2020). These core activities also resonate with the Finnish curriculum, which emphasises for instance collaborative learning and physical activities as opposed to sedentary lifestyle (see Finnish National Board of Education, FNBE, 2016).

The teachers in the Finnish problem-solving project implement these three core activities in their lower secondary mathematics classrooms from the beginning of the school year. The rest of the 14 teaching practices they implement into their teaching gradually throughout the school year. For this, they receive intensive support through workshops and informal meetings with the researcher.

## **Methods**

### **Participant**

The teacher, Ashley, is a mathematics, chemistry, and physics teacher at a lower secondary school in Finland. She has 3 years of teaching experience after graduating from a university, where she majored in mathematics. Ashley takes part in the project with two mathematics groups, one group from 8th grade and one group from 9th grade (13-16 years old pupils).

### **Data collection**

The data were collected during the first semester of the intervention through two interviews, classroom observations and informal discussions with Ashley between the lessons. The interviews were audio-recorded, while other data supports on field notes.

To answer the first two research questions about Ashley's teacher identity and view of mathematics, the data were collected from the first interview that took place in the beginning of the intervention. The interview was about Ashley's educational background, previous professional development projects, her prior and current teaching, insights into her possible future teaching, and about her hopes and needs for the intervention (cf. view of mathematics in Op't Eynde et al., 2002). She was also asked to explain how certain she is about her knowledge and skills in mathematics.

The data for the third research question about Ashley's professional development were collected through the second interview about two months after the start of the project, classroom observations and informal discussions over the time of the first intervention semester. These data focused on the experiences from using the new teaching method in Ashley's mathematics classrooms.

Alongside with implementing the new teaching method into her teaching, Ashley took part in workshops that were built around the building thinking classroom–method. She was introduced to the main ideas and prior results of utilising the method in mathematics classrooms and given hints on how to deal with challenging classroom situations that might occur during the intervention. It is important to recognise the possible influence of the workshops on Ashley’s professional learning.

### **Data analysis**

The data were analysed through data-driven content analysis. The first part of the analysis focused on the first research question about the growth of Ashley’s teacher identity. The analysis followed the professional developmental path that Ashley describes in the interviews from university studies to the beginning of the problem-solving intervention. Ashley’s narrative made it possible study the affective factors that are central for her (Di Martino & Zan, 2015). Moreover, the issues that she highlighted from her past were interpreted as instances relevant to the development of her mathematics-related teacher identity (Lutovac & Kaasila, 2018).

To answer the second research question about tensions, Ashley’s mathematics-related teacher identity was contrasted with the view of herself as a mathematics teacher and how she experiences her own mathematics teaching (cf. Op’t Eynde et al., 2002). Tensions between the experienced and ideal mathematics teaching, as well as experienced teacher self and ideal mathematics teacher, were interpreted as (perhaps unconscious) needs for professional learning (cf. André et al., 2019).

To answer the third research question, Ashley’s expressed goals for professional learning together with the needs arising from tensions are discussed in the light of the opportunities that the problem-solving intervention offers for professional learning, and what changes in her mathematics-related teacher identity Ashley experiences during the first semester of the intervention.

## **Results**

### **Developing mathematics-related teacher identity over time**

Ashley is a young mathematics teacher with a strong need to find a teaching style that feels her own. She has been pursuing towards this goal since being a mathematics teacher student at university. While the university failed to give her enough opportunities to rehearse her mathematics teaching in practice (she reports only having two practice lessons in mathematics), and thus help her to develop a strong mathematics-related teacher identity, she has been testing different teaching methods systematically in her own secondary mathematics classrooms.

By the time of the problem-solving intervention, Ashley has been teaching in this specific lower secondary school for two years. During this time, she has pursued towards more pupil-led teaching practices. She has tried different methods, such as task cards, to support pupil autonomy in learning. She has been guiding pupils to take more responsibility of their own learning and to study mathematics at their own pace. The pursued changes resonate well with the current national curriculum (see FNBE, 2016). She has also tried to differentiate learning especially upwards to create challenges also to high achievers. In Finnish lower secondary school, extensive learning support is given for low-achievers by law, but whether and how the high-achievers receive suitable challenges is dependent on the individual mathematics teachers.

After the first year of working individually towards developing her teaching, Ashley started to collaborate more with two other teachers in her school. This community of practice (cf. Wenger, 1998) has become an important resource for her. The teachers share ideas as well as plan and develop their mathematics teaching systematically together. On the classroom level, their goal has been to engage pupils more in learning mathematics. The three teachers also participate in the reported problem-solving intervention together.

Despite the many professional development projects, implemented individually or with colleagues, and even though she has found methods that engage pupils more in mathematics lessons, Ashley feels that these attempts have not been successful in the sense of finding a teaching method that 'feels her own' (her own words).

### **Tensions in mathematics-related teacher identity**

There are many tensions in Ashley's experienced and ideal mathematics teaching. She is aware of these tensions when she talks about them but, at the same time, it seems that despite the many attempts she has not been able to find tools to answer these needs in her mathematics teaching.

The first tension is between the teacher-led and pupil-led teaching methods. Ashley pursues towards pupil-led learning where pupils take a bigger responsibility in their own learning. In some groups, using the task cards is a step in this direction. However, she finds herself talking a lot in the lessons and explaining mathematical content to the pupils instead of guiding them towards more self-regulated learning.

The second tension is between the processes and the outcomes of solving tasks in mathematics lessons. Ashley explains how she tries to emphasise the solution processes over the correct answers. However, what she experiences in classrooms is that pupils concentrate heavily on the correct answer. Even a small miscalculation can lead to the pupil thinking that the whole task was incorrectly solved.

The third tension is about the number and quality of tasks solved in mathematics lessons. At the university, she realised that mathematics is more about the thinking processes and having a small number of good tasks, rather than solving a big number of routine tasks. As a mathematics teacher, however, she feels that she has moved back to teaching through calculations, as she was taught self in school. Even if all pupils have the freedom to select tasks, the emphasis is on calculating and not on thinking.

Ashley's view of herself as a mathematics teacher is very close to her view of a good mathematics teacher. She explains that, similarly as a good mathematics teacher, she is easily approachable, she is genuinely interested in pupils' learning, she is fair, and treats all pupils equally. Additionally, she likes mathematics, but is highly self-critical towards her teaching. The researcher's notes from mathematics lessons and after-lesson discussions support these self-reflections from the interviews.

In the interview, Ashley emphasises that a good teacher also masters the content, adapts to different situations, is up to date, and can revise her own teaching. These are all elements that Ashley can be related to through her self-efficacy beliefs of mastering the mathematical content to the purposeful development of her own teaching. Hence, even though not explicitly said, my interpretation is that Ashley sees herself as a good mathematics teacher.

## **Learning from the problem-solving project**

When asked explicitly, Ashley's goal for the problem-solving project is (free translation):

To find a way to teach mathematics that motivates pupils, so that it would be nice to come to the classes, it would be nice to be there, I would enjoy being there, and that we get things done. And that everyone is included, everyone gets some kind of support even if not originating from the teacher, and everyone gets experiences of success.

While the explicit goal for the project is more on the affective level, similarly as the need to find a teaching method that feels a natural part of herself, the tensions stemming from the interview data highlight more concrete needs; Ashley wants her teaching to be more pupil-centred, tasks to concentrate more on thinking rather than calculations as well as to the processes rather than the answers, and learning to be more qualitative instead of rushing through a long list of tasks.

The goals reflecting the tensions in Ashley's mathematics teaching are well in line with the building thinking classrooms–method (see Liljedahl, 2020). Already after two months of implementing the building thinking classrooms–method into her mathematics classrooms, Ashley starts every lesson with a problem (pupil-centred learning that fosters thinking), divides pupils visibly into random groups using playing cards (social gains, among other things), and have pupils work standing on vertical non-permanent surfaces (blackboard, whiteboard tape and windows). She has also paid attention to answering pupils' questions, creating tasks that support group discussion and the processes of learning, how to level learning in classrooms, and how to organise the physical classroom environment to support the desired classroom activities.

The changes in Ashley's classroom practices have been rapid. Only after two months, Ashley explains that she has found the basic idea behind the building thinking classrooms–method, and she has been able to adapt the method into a natural part of her teaching. The building thinking classrooms–method has answered to her needs, especially those viewed through tensions. She also feels that the intervention has had a positive impact on pupils' learning and on classroom climate. Whether the change is sustained over time, we will see after the problem-solving intervention is over (delayed interview and classroom observations).

## **Discussion**

The purpose of the paper was to explore Ashley's mathematics-related teacher identity through view of mathematics and changes in her teacher identity, as well as through the link between identity and teaching practices (see Lutovac & Kaasila, 2018). These issues were studied through affective lenses with an individual emphasis.

The first research question drew attention to the development of Ashley's teacher identity. This question revealed a severe deficiency in Ashley's teacher education that led her to systematically search for teaching methods that would fit to her view of good teaching. The question also revealed the importance of the social aspect in creating a mathematics-related teacher identity. When Ashley talked about her previous professional development projects, she highlighted the importance of other mathematics teachers at her school. This community of practice (Wenger, 1998) has been a great

resource for her in developing teaching and mathematics-related teacher identity. As a result, Ashley has high self-efficacy beliefs and confidence towards classroom inquiries.

The second research question focused on the tensions between Ashley's experienced teacher identity and her view of good mathematics teaching. There were no tensions recognised between Ashley's view of herself as a mathematics teacher and a description of a good mathematics teacher. This indicates a quite well-established teacher identity. Ashley was very aware of her strengths and weaknesses in mathematics, and she recognised many tension in her mathematics teaching (cf. Pillen, Beijaard & Brok, 2013). However, what was not recognised was the tension between the verbalised goals for the intervention and the tensions in Ashley's mathematics teaching. This realisation takes us to the third research question about Ashley's needs for professional development.

While novice teachers traditionally are willing to rethink their teaching practices (Liljedahl, 2014), Ashley was ready to reject bigger parts of her teaching. Ashley's needs for professional learning were connected to the teaching and learning activities rather than to mathematical content (Lutovac & Kaasila, 2018). As a result, the problem-solving intervention seemed to have a very positive impact on Ashley's identity building and professional development. After a short period of implementing the new teaching method into her mathematics teaching, Ashley started to see changes in the classroom practices (addressing tensions) and in the emotional atmosphere in the classroom (addressing goals), resulting in a method that 'feels her own'. While these results are encouraging for the success of the intervention, they also confirm some previous research results and raise questions.

First, it seems that the tensions Ashley recognised were at least partly solved. This confirms prior research about the nature of tensions, that is, previously incompatible tensions can be solved (Andrá et al., 2019). Second, teacher identity is a social construct (Wenger, 1998) that is influenced not only by colleagues but also by pupils in the classroom. The positive impact that the intervention had on Ashley's teacher identity was highly influenced by the pupils' actions and reactions in the classroom.

The questions that raised from the study are connected to the interrelation between tensions (needs) and goals (wants) in novice teachers' identity building and professional development. Ashley reported being successful in terms of pupils' learning and motivation also in her previous interventions. What seems to be different this time is, that the intervention also addressed the tensions in her teaching positively. Indeed, what seemed to be a challenge for Ashley was to identify the tensions as concrete goals for her professional development. So, are solving tensions more powerful tool for professional development than fulfilling teacher's goals? There is a need for further studies on the interrelation between tensions and goals in professional development projects that aim to improve classroom practices and teacher identity.

## References

- Andrá, C., Rouleau, A., Liljedahl, P., & di Martino, P. (2019). An affective lens for tensions emerging from teacher professional development. *For the Learning of Mathematics*, 39(1), 2–6.
- Beijaard, D., P.C. Meijer, & N. Verloop. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education*, 20(2), 107–128. <https://doi.org/10.1016/j.tate.2003.07.001>

- Di Martino, P., & Zan, R. (2015) The construct of attitude in mathematics education. In B. Roesken-Winter & B. Bepin (Eds.), *From beliefs to dynamic affect systems in mathematics education* (pp. 51–72). Springer.
- Finnish National Board of Education. (2016). *National Core Curriculum for Basic Education 2014*. Finnish National Board of Education.
- Hannula, M. S. (2012). Exploring new dimensions of mathematics-related affect: Embodied and social theories. *Research in Mathematics Education*, 14(2), 137–161. <https://doi.org/10.1080/14794802.2012.694281>
- Laine, A., Näveri, L., Ahtee, M., Pehkonen, E., & Hannula, M. S. (2018). Connections of primary teachers' actions and pupils' solutions to an open problem. *International Journal of Science and Mathematics Education*, 16(5), 967–983. <https://doi.org/10.1007/s10763-017-9809-3>
- Liljedahl, P. (2014). Approaching professional learning: What teachers want. *The Mathematics Enthusiastic*, 11(1), 109–122. <https://doi.org/10.54870/1551-3440.1294>
- Liljedahl, P. (2020). *Building thinking classroom in mathematics, grades K-12. 14 teaching practices for enhancing learning*. Corwin Press.
- Lutovac, S., & Kaasila, R. (2018). Future directions in research on mathematics-related teacher identity. *International Journal of Science and Mathematics Education*, 16(4), 759–776. <https://doi.org/10.1007/s10763-017-9796-4>
- Metsämuuronen, J., & Tuohilampi, L. (2014). Changes in achievement in and attitude toward mathematics of the Finnish children from grade 0 to 9: A longitudinal study. *Journal of Educational and Developmental Psychology*, 4(2), 145–169. <https://doi.org/10.5539/jedp.v4n2p145>
- Op't Eynde, P., de Corte, E., & Verschaffel, L. (2002). Framing students' mathematics-related beliefs. In G. C. Leder, E. Pehkonen, & G. Törner (Eds.), *Beliefs: A hidden variable in mathematics education* (pp. 13-37). Kluwer Academic Publishers.
- Pillen, M., Beijaard, D., & Brok, P. D. (2013). Tensions in beginning teachers' professional identity development, accompanying feelings and coping strategies. *European Journal of Teacher Education*, 36, 240–260. <https://doi.org/10.1080/02619768.2012.696192>
- Stigler, J., & Hiebert, J. (1999). *The teaching gap*. The Free Press.
- Vettenranta, J., Välijärvi, J., Ahonen, A., Hautamäki, J., Hiltunen, J., Leino, K., ... Vainikainen, M.-P. (2016). *PISA 15 ensituloksia: Huipulla pudotuksesta huolimatta*. Opetus- ja kulttuuriministeriön julkaisuja 2016:41. Finnish Ministry of Education and Culture.
- Viitala, H. (accepted). Excited but sceptical: Examining teachers' motivational aspects for a professional development project. *Accepted as paper to 14th International Congress on Mathematical Education (ICME-14)*.
- Wenger, E. (1998). *Communities of practice*. Cambridge University Press.