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The role of practicum teachers in mathematics teacher identity development

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This study aimed to explore significant others, referring to the individuals who have effects on identity development, in mathematics teachers' stories of teacher identity development. In line with this aim, five middle school mathematics teachers have been monitored in their last two years of the teacher education program and their first year of in-service teaching. The data were collected through a total of three interviews, each held at the end of the year. Analysis revealed that practicum teachers were one of the significant others in participants' mathematics teacher identity development. Practicum teachers became role models for the participants in terms of pedagogical and mathematics teaching practices. Based on their observations of practicum teachers, they developed some intentions about how the relationship with students should be developed and which methods should be preferred while teaching mathematics.

Keywords: Identity, mathematics teachers, significant others, practicum teacher.

Introduction

Developing a professional teacher identity is considered critical in the process of becoming an effective teacher (Flores & Day, 2006). Therefore, there is an increasing number of research studies in the educational literature that investigate teacher identities of preservice and in-service teachers, and the factors affecting teacher identity development process (Akkerman & Meijer, 2011; Darragh, 2016). Earlier studies revealed that the periods spent in teacher education programs and the first few years of in-service teaching are highly influential in the teacher identity development process (Beauchamp & Thomas, 2009). Determining the various factors affecting teacher identity development in this period is essential to provide the necessary support that teachers and teacher candidates seek (Beauchamp & Thomas, 2009).

Existing studies in the literature have predominantly focused on the experiences that support or hinder teacher identity development. These studies revealed that experiences in studentship (e.g., Trent, 2011), teacher education programs (e.g., Anspal et al., 2012), working contexts (e.g., Arslan et al., 2022), and professional development programs (e.g., Ntow & Adler, 2019) might have a significant impact on teachers' identity development. Even though experiences are critical sources of identity development, these experiences are filtered through individual agency (Holland et al., 1998). Similar experiences might not affect teacher identity development in a similar manner. For instance, teachers who had similar experiences during their teacher education program may develop contrasting teacher identities (Arslan et al., 2022), or teachers who work in similar working contexts may respond differently to professional development experiences, and these experiences may not have the same effects on their teacher identities (e.g., Ntow & Adler, 2019). Therefore, it might be claimed that

experiences in various communities are highly important in teacher identity development, but they are not the only influential factor.

In addition to individuals' experiences, different theoretical perspectives consider "others" as one of the influential factors in identity development (e.g., Sfard & Prusak, 2005; Wenger, 1998; Van Zoest & Bohl, 2005). Others' identities might be an inspirational source (Akkerman & Meijer, 2011), and others' experiences with or expectations of us might be highly influential in the teacher identity development process (Czerniawski, 2011). However, there is little known about who are these other individuals, who are described as significant others in this study, and how they affect mathematics teachers' identity development. Therefore, this study aimed to explore these significant others and their effects on the teacher identities of mathematics teachers who have been monitored in the last two years of the teacher education program and the first year of in-service teaching. Specifically, the following two research questions were addressed in this study: (1) Who were the significant others in mathematics teachers' stories of teacher identity development? and (2) How did these significant others affect the identities of mathematics teachers?

Theoretical background

Various perspectives on identity development have guided mathematics teacher identity research in the literature. One of the commonly used perspectives is participative perspective (Darragh, 2016). Studies adapting the participative perspective often refer to the theoretical frameworks offered by Wenger (1998) or Holland et al. (1998). In the participative perspective, it is claimed that identity is developed through one's participation in social communities. Participation in social communities enables one to gain meanings from the interactions made with others in the community, and these meanings shape identities (Wenger, 1998). Based on the findings in the literature, teacher education programs and working schools are considered as critical communities in the teacher identity development process. Thus, the current study aimed to focus on the years spent in both communities to have a better understanding of developed mathematics teacher identities and mathematics teacher identity development process.

Although acknowledging the critical role of social participation in identity development, Sfard and Prusak (2005) criticised participative perspectives for not providing operational definition. In their narrative perspective, they defined identity as "a collection of stories about persons or, more specifically, as those narratives about individuals that are reifying, endorsable, and significant" (Sfard & Prusak, 2005, p. 16). Their identity definition has two aspects: actual and designated identity. Actual identity is defined as the identity that one has already developed, whereas designated identity is defined as the identity type that one wants to develop. In their perspective, identity development is considered as the process where one closes the gap between these two identity types. Sfard and Prusak (2005) put special emphasis on the role of others in identity development. They claimed that some others in one's life are highly significant to shape identities. Therefore, such others are defined as significant others in the current study and these significant others were explored in mathematics teachers' actual and designated identity narratives.

Methodology

Participants and context

The current study is a part of a larger study in which five middle school mathematics teachers' identity development stories have been monitored in the last two years of the teacher education programme and at the end of their first year as in-service mathematics teachers. Participants were preservice teachers in a 4-year middle school mathematics teacher education programme at a Turkish university where I was working at the time of data collection. As a result of teacher education policy, all the mathematics teacher education programs aim to train preservice teachers to support conceptually oriented learner-centered mathematics teaching practices. The only teaching practice experience was offered to the preservice teachers during the final year of the program. In the first semester of the teaching practicum course, preservice teachers observe middle school mathematics teachers' practices. In the second semester of the course, along with the observations, preservice teachers were required to teach at least one lesson, which was observed by the university mentor and practicum teacher. Based on the policy of the teacher education program where the participants attended, practicum schools were changed in each semester to enable preservice teachers to have practicum experience in two middle schools. After introducing the longitudinal nature of the study to all preservice teachers in the program, five preservice teachers became volunteers to be participants. Four of them were female (P1, P3, P4, and P5) and one of them was male (P2).

Data collection and analysis

Three interviews—at the end of the third and fourth years of the teacher education programme, and at the end of first year in the profession—were conducted with each participant. The first interview was about uncovering participants' studentship experiences and their experiences up to that point in the teacher education program. The second interview focused on their experiences in the final year of the program and in the teaching practicum schools. The final interview was about their experiences as in-service teachers.

In the data analysis, Sfard and Prusak's (2005) guide for determining actual and designated identities was followed. They stressed that some words—such as *be*, *never*, *always*, *want to*, *should*—in narratives are indicative of actual and designated identities. Statements including such words were identified among the data set, mathematics teacher identity development stories for each participant were developed for each participant, and all the participants confirmed that the stories reflect their own journey of becoming mathematics teachers.

The developed mathematics teacher identities and identity development process are the focus of the larger study that previously mentioned. In this study, the focus was on the significant others that have effects on participants' mathematics teacher identity development. In order to determine these significant others, constant and comparative method was applied for the data set that includes the above-mentioned statements (Merriam, 2009). In applying this method, referral to individuals in actual and designated identity narratives was searched and constantly compared among the data set. This process enabled to determine common significant others among participants' mathematics teacher identity development stories.

Findings

The analysis revealed four significant others in mathematics teachers' stories of teacher identity development: own teachers during studentship, practicum teachers, colleagues, and school administrators. Due to the page limitation, only the influence of practicum teachers was explained in this paper.

Participants' observations of their practicum teachers' practices seemed to shape their understanding of how a mathematics teacher should be. In other words, practicum teachers influenced participants' designated mathematics teacher identities. This influence seemed to be related to various aspects of teaching. One of these aspects was about classroom management and the relationship with students.

She [the practicum teacher] is an idol for me. I think that she is very successful in terms of classroom management. She has very strong communication with students. Her reactions to problems were not typical of what I would expect. I want to be like her; she became a role model for me. (P5)

It is very important to make the student like you while also giving them a sense of authority. That is what I saw in these two [practicum] teachers. (P4)

Participants' designated identities in terms of their relationships with students were not only influenced by positive practices of practicum teachers; in some cases, practicum teachers became anti-role models for them.

I was able to see how the students felt in the lessons. Even I was getting nervous in that teacher's lessons. As soon as we entered the classroom, the students were asking if the teacher would come [...] I certainly do not want to be that kind of teacher. (P3)

It looks like she does not want to be in the classroom. She seemed to be so unmotivated. I am not sure how I will look after fifteen years in the profession, but it should not be like her. When she is like that, it negatively affects the classroom environment. Students do not get motivated for the lesson. I think we [teachers] should be energetic first to make the students motivated for the lesson. (P5)

Another aspect of the influence of practicum teachers on the participants' designated identities was about mathematics teaching methods. Observing the effects of mathematics teaching methods in real teaching environments shaped their intentions about mathematics teaching. Practicum teachers' methods of teaching were filtered as desired or undesired in the eyes of the participants. Desired mathematics teaching methods were those that were consistent with conceptually oriented mathematics teaching, which was also supported in their training in the teaching education program.

It was quite beneficial for me to observe the practicum teacher in algebra topics. My teaching methods were different from his, and I saw that his methods were effective. I plan to use his method of teaching for that topic. (P2)

One of the practicum teachers was actively using Geogebra in his classes. Geogebra allows him to show the changes dynamically, which he cannot do on the board. It was very effective. He was also using [NCTM's] Illuminations. (P3)

He teaches every topic with the goal of having students understand the underlying reasons [for the facts]. For instance, students could easily ask him to show it on Geogebra to understand what he means. When students get used to being taught with such methods, they understand better. I think it is very important to enable students to understand but not memorize. (P4)

Undesired mathematics teaching methods were teacher-centered practices. The participants stressed that they do not want to use such methods in their future career.

The first teacher taught the factorization topic, but only through lecturing and asking students to remember. I was surprised to see that. I am not going to teach in that way [...] Such observations clarified my ideas about the teaching methods I want to use. (P1)

I have not seen anything different in the teaching of the other teacher. She opens the book on the smart board and directly follows it. I do not like this. (P3)

Even if there are [mathematics teaching] materials in the school, she [practicum teacher] does not use them at all [...] I do not want to be a traditional teacher like she is. I want to use activities; I want to make students show their creativity in my lessons [...]. (P5)

Even though practicum teachers' influence appeared more on designated identity narratives, there were also a few cases where the influence of practicum teachers became visible on actual identity narratives. When practicum teachers' teaching practices are in line with the training in the teacher education program, it might help the participants have a better understanding of their experiences in the teacher education program.

I have a theoretical knowledge [of how mathematics should be taught]. But, when I saw practicum teachers apply these, it became permanent for me. I have better understanding now. (P1)

The influence of practicum teachers was often evident in the final year's narratives, but in some cases, the participants stressed how their interaction with practicum teachers shaped their actual identities when they began actual teaching.

I am still asking Teacher X for her thoughts on my activities as I prepare for the lesson. I am still in contact with Teacher Y. I am trying to teach in their style. (P4)

Discussion

The findings revealed that practicum teachers often influenced the participants' designated identities in terms of how to manage the classroom and teach the mathematical content. Sfard and Prusak (2005) consider the designated identity crucial in the identity development process since individuals act to achieve their designated identities.

Practicum teachers' practices seemed to be considered desirable or undesirable according to the participants' training in the teacher education program. In this regard, participants had the opportunity to observe the effects of practicum teachers' learner-centered and teacher-centered mathematics teaching practices in real-world classroom settings. These observations enabled them to support their intentions of applying learner-centered mathematics teaching practices in their future careers. Observing learner-centered practices and their effects in real class settings is critical since preservice

teachers might have limited understanding of learner-centered mathematics teaching despite their long training in mathematics teacher education programs (Van Putten et al., 2014). When early-career teachers do not develop an understanding of and a repertoire for learner-centered practices, they experience problems applying learner-centered teaching in their classes and gradually move to teacher-centered practices (Flores & Day, 2006). Therefore, comparing practicum teachers' learner- and teacher-centered practices in real class settings might help them to develop this understanding and repertoire. Furthermore, the practicum course might be supported with other experiences such as watching and critically reflecting on video cases of other teachers' mathematics teaching practices (e.g., Çelikdemir & Haser, 2023) or some script-writing tasks (e.g., Zazkis & Zazkis, 2014). Such experiences might also help preservice teachers develop a repertoire of learner-centered mathematics teaching in their teacher identity development process.

Another aspect of the influence of practicum teachers was classroom management, which was found to be highly challenging for early-career teachers (Flores & Day, 2006). Based on practicum teachers' behaviours, participants seemed to develop a schema to apply in their future careers. They often mentioned their desire to develop a strong relationship with students without losing their authority in the class. Keeping this balance is an issue for many early career teachers (Pillen et al., 2013). Observing practicum teachers who were successful in maintaining this balance appeared to support participants in developing similar ways to the practicum teachers.

Although practicum teachers appeared to have a strong influence on designated identities, their influence on actual identities was limited. One of the possible reasons for this limited influence might derive from the nature of teaching practice courses in the national context. In the teaching practice course, preservice teachers had very limited opportunities to teach on their own. One of the critical sources of identity development is reflection (Alsup, 2006). When there was limited opportunity to practice, the participants might not reflect enough on their actual identities. It would be more beneficial to support participants' actual identities if they would practice more and reflect on their practices with the practicum teachers.

The findings of this study might have implications for teacher education programs. In the teacher education program, preservice teachers went to two practicum schools. This enabled them to observe more than one practicum teacher. When the influence of practicum teachers revealed in this study is taken into consideration, observing more than one practicum teacher might be beneficial for preservice teachers. As exemplified in this study, practicum teachers' practices might not be necessarily in line with the philosophy of teacher education programs. In this study, the participants mentioned that they learned how not to be teachers when they observed such practicum teachers. However, such practicum teachers might negatively affect preservice teachers' identity development (e.g., Yuan & Lee, 2016). Therefore, practicum teachers should be selected purposefully by considering their pedagogical and mathematics teaching practices, which support the philosophy of teacher education programs. By doing so, theoretical training in teacher education programs can be supported with practical experience in practicum schools, and preservice teachers' actual and designated identities become stronger before their actual teaching begins.

Even though practicum teachers appeared as a significant other for participants' identity development, the other contributor of the teaching practice course—the university mentor—did not appear as a significant other. The teaching practice course is often the only opportunity for teacher education programs to interact with real schools, and it is thus critical for the development of preservice teachers' identities (Van Zoest & Bohl, 2005). The findings did not reveal that such an interaction occurred for the participants in this study. Practicum teachers and university mentors' effective collaboration in the teaching practice course might support preservice teachers' actual and designated identities in line with their training in teacher education programs, and university mentors might become another significant other for preservice teachers.

Newcomers' identities are highly influenced by their experiences in the new community in which they participate, but they might influence others' identities in that community as well (Wenger, 1998). Preservice teachers bring their experiences from the teacher education program to practicum schools, and this might also affect the identities of practicum teachers. Even though such an investigation was beyond the scope of this study, further studies might investigate how practicum teachers' identities are affected.

In brief, the current study revealed that practicum teachers might be one of the significant others for participants' designated identities; and thus, these teachers should be purposefully selected by the teacher education programs. Furthermore, practicum teachers had some influence on participants' actual identities, but this influence should be improved by allowing preservice teachers to practice more and reflect on those practices with their practicum teachers.

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