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The focus on the student perspective in a microteaching task for mathematics teacher trainees

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The paper examines a task for teacher trainees in a study abroad program for mathematics preservice and in-service teachers. It aims to find out what and how participants learn through a component of role-play in a microteaching task, which has not been described previously in the literature. The study uses mixed methods analysis of 9 interviews and a questionnaire. The results suggest that through role-play and reflection participants move through various stages of awareness of the student perspective, and learn about adjusting teaching to students' needs in their target teaching contexts.

Keywords: Microteaching, teacher education, knowledge base for teaching, mathematics education, student needs.

Introduction

This research was initiated by a gap I noticed in the literature concerning assigning specific student roles to participants in a microteaching task. The context of the research is the study abroad program Budapest Semesters in Mathematics Education, whose aim is to immerse preservice and inservice teachers into Hungarian style Guided Discovery (Gosztonyi & Varga, 2023). Participants gave accounts of having many eye-opening experiences about education (Juhász et al., 2020), however they were worried about how to transfer those experiences into their own teaching context. In order to help make the connection between the two contexts, I use a task which situates their future teaching context into the present academic context as suggested by Putnam and Borko (2000). The task is microteaching (Karlström & Hamza, 2019), where participants teach a class to fellow program participants, who role-play secondary students in the teacher's target context.

In order to make the teaching context during microteaching more realistic, participants need to write a detailed and realistic description of the school, the class, and specific student roles. Reflection (Poldner et al., 2014) is integrated into the task at multiple stages in order to help transferring teacher knowledge between the different domains the task connects: the participants' own experiences as a student and as a teacher, their experiences during the program, their experiences during the different stages of microteaching, and their target teaching contexts. After introducing the task, I observed that when participants role-play students, they gain knowledge about the perspectives and needs of different student characters, hence I added a written reflection on playing the student role in order to increase awareness and maximise learning in this aspect.

In the literature I have not found any evidence of microteaching or role playing tasks that work with specific student roles, or studies that examine learning through playing roles (the focus is always from the perspective of the teacher in the role-play situation, e.g. Karlström & Hamza, 2019). My assumption is that through designing specific and diverse student roles, playing these roles, and multiple phases of reflections, participants learn more about the student perspective. In order to

examine this assumption, I posed the following research question: *What do participants learn about the student perspective during a microteaching task with an added focus on role-play, and how does this knowledge evolve during the different components of the task?*

Theoretical framework

For teacher knowledge I use the framework of Blömeke et al. (2015), which identifies three situation-specific skills, *perception*, *interpretation* and *decision making*, which are rooted in disposition (cognition and affect-motivation), and are translated into observable behaviour. The target teacher knowledge is teaching mathematics through the Hungarian Guided Discovery approach, an inquiry-based approach involving rich tasks, re-discovery processes of mathematics, diversity of tools and representations, and respecting and valuing students' diversity (Gosztonyi & Varga, 2023).

One of the tasks aiming at acquisition of teacher knowledge is microteaching. According to Karlström and Hamza (2019) the basic components of microteaching are trainees planning a short unit, teaching it to peers, and reflecting on teaching, while components can be added or altered. Poldner et al. (2014) state that reflection is based on experiences, feelings and knowledge (p. 3), followed by an evaluation of these experiences, feelings and knowledge, then planning and taking further action. To perform these steps, teacher trainees must use cognitive and affective activities, and the outcome is transformation of knowledge on the cognitive and affective level.

The ERIC Thesaurus (2013) defines "perspective taking" as "perceiving physical, social, or emotional situations from a point of view other than one's own". I use the term "student perspective" for participating in or thinking about a teaching situation from a student's point of view. Gutiérrez (2012) emphasises the importance to "recognize a student's unique perspective along side of but equally important to a mathematician's or math educator's view" (p. 38.) in order to suit the needs of a diversity of students. Recognising the student perspective is especially important when teaching with Guided Discovery, as it strongly builds on students' needs and thinking (Gosztonyi & Varga, 2023).

Methods

Context

The microteaching task in question is used in the Practicum course of the study abroad program Budapest Semesters in Mathematics Education, in order to help participants apply what they learn about Guided Discovery to their target teaching context in the future. The usual plan, teach, and reflect phases of microteaching are extended by the role-play aspect, resulting in the following task structure (components connected to role-play are italicised):

- Context design: Each participant describes a school where they imagine themselves teaching in the future, or which they know from past experience. They describe a course, a specific class topic, and a group of students. *They describe a specific number of student roles in detail.*
- Lesson planning: Lesson planning is a multistep process with various forms of feedback.
- Teaching and discussion: The participant introduces the context, randomly assigns roles to other participants, and teaches the lesson while *participants play their roles*. Then the teacher reflects on the lesson, *participants give feedback from the perspective of their student roles* and from a teaching perspective, followed by instructor feedback.

- Post-reflection: After the session, the participant receives the video recording of their lesson, and writes a reflection about their lesson. *Each participant also writes a reflection about what they learned from playing student roles in other participants' lessons.*

Data collection

I used mixed methods (Buchholtz, 2019): a set of semi-structured interviews and a questionnaire I developed for this study. In the questionnaire participants were asked to decide for each phase of the microteaching task how dominant in their awareness was the perspective of the student versus the perspective of the teacher on a scale of 7 (from fully student perspective to fully teacher perspective). The process was broken down to 10 phases in the questionnaire (see phases in Table 1). Phases were established in a way that the phases added with role-play would be separate even if shorter, while some multi-step phases were kept as one if steps are similar in terms of perspective.

The aim of the questionnaire was two-fold: (a) Knowing participants' perspective in each phase informs how their knowledge evolves during the microteaching process, so the questionnaire was used to complement and triangulate (Buchholtz, 2019) the results of the interviews. (b) Interview participants were asked to fill out the questionnaire during the interview, and their answers determined the focus of some further interview questions, so the questionnaire also had a development purpose (Buchholtz, 2019) during interviews.

The first step of data collection was carrying out interviews. Interviews had the following process:

- Asking about the participant's main takeaway from the task (in order to have data about the highlights of their learning with the least guidance possible).
- Asking participants to fill out the questionnaire (the aim of filling out the questionnaire during the interview was to filter phases that are the most relevant for the next question, and to aid participants think back to their experiences).
- For each phase for which the participant put an answer leaning more towards the student perspective or equal, asking about their main takeaways for the phase (in order to gather data about learning and processes in each phase).
- Asking participant about challenges and suggestions about the task in general and concerning the student perspective (in order to bring in further experiences)

The second step of data collection was emailing the questionnaire to all former participants. The research population was all former participants of the microteaching task, with 16 groups of preservice and inservice secondary teachers between 2017 to 2022 with variations in size and being in person / online. The selection process for the interviews and the questionnaire was based on volunteering, and volunteers happened to be representative of the whole population in terms of the different variants described above. I did 9 interviews, and received 20 answers for the questionnaire.

Data analysis

I coded interview transcripts from two orthogonal aspects:

- *Content*: all segments related to the student perspective were analysed using thematic analysis (Braun & Clarke, 2012). To each interview segment I attached an inductive code summarising

and somewhat abstracting it. After finishing, I recoded the data. Then I organised codes into themes, and recoded again.

- *Phases*: to each interview segment coded with a content code, I attached a deductive code: one of the ten different phases used in the questionnaire.

After coding, I wrote a narrative of the results based on phases, then reorganised it based on the themes, a summary of which is presented below. Finally I analysed the questionnaires. I transformed answers to numbers -3 to 3, where -3 represents fully teacher perspective, and 3 represents fully student perspective.

Results

Qualitative analysis of interviews

In the thematic analysis of content codes the following main themes emerged:

- Role-play versus reality: how the simulated context of role-play relates to reality
- Stages of awareness of the student perspective
- Relationship between the stages of awareness

Role-play versus reality

When designing the class profiles (including specific student roles) and when playing the roles, participants aimed at imitating the real situation: based the class profiles on their own experiences, and tried to act realistically. At the same time, they were also aware of the role-playing nature and made adjustments in order to maximise their own and their peers' learning: setting the right level (not too little but not too much) challenge for themselves / their peers as teachers, and helping others try out different identities. During role-play, acting realistically came with various challenges which often were centred around finding a right balance: e.g. scaling down their knowledge, or acting a disability without being offensive.

During planning and teaching the lesson, participants described challenges connected to the realness of the situation (e.g. having a diversity of students), and challenges associated with role-playing (e.g. predicting how participants would act in their roles). Sometimes they observed that challenges arising from role-play imitate the uncertainty of real life situations:

Sarah: I think my main challenge was just walking into the room and not really knowing how everyone was gonna act. [...] I remember having to deal with that felt like being a substitute teacher [...] or like being a teacher at the very beginning of the school year.

Stages of awareness of the student perspective

I identified three stages of awareness of the student perspective:

1. *Identifying with the student (student shoes)*: when role-playing student characters, participants often immersed themselves in their roles as much as possible.

Fiona: I was kind of trying to play the role of the character. And in that moment, I was more focused on sort of how I was interpreting the lesson and what my character was getting from the teacher [...] and how I was feeling and just paying attention

to what my character would have done in the situations that were proposed by the teacher.

2. *Understanding the student perspective*: participants gained conscious understanding of the student perspective. The source of understanding could come from role-playing a student with a different experience from their own; observing other participants playing roles; designing realistic class profiles with diverse student roles; and receiving feedback on their lesson from other participants about their experiences, emotions and difficulties from a student perspective.

Lora: As you're reading the profiles [roles written by fellow participants] and as I was also making the profiles for my own lesson [...] I knew from a logical perspective, but they made me internalise: Oh, students have a lot going on outside of school, and they bring all that in. And as a teacher, you have to be aware of whatever students bringing.

3. *Adjusting teaching to students' needs*: participants discussed adjusting teaching to students' needs mostly in terms of teaching in a way that is engaging, and appropriate to a variety of students. They already started thinking about ways to adjust their teaching when designing the student roles, and they were also considering this when designing the lesson plan. During teaching the lesson, they needed to adjust to various unexpected circumstances.

Nora: Just making sure, because there are different student profiles, that the lesson is scaffolded in a way where maybe students who are a little bit more advanced can perhaps do more independent work, and then students who do need a little bit more hands on attention, or more time, they're not going to slow the entire group down.

Relationship between the stages of awareness

I found two different relationships between stages of awareness:

- *Conflict between the student and the teacher perspective*: situations when more focus on one perspective meant less focus on the other perspective

Mia: In most of the process I honestly was thinking a lot about how the students would approach the problem and what they would be doing, and less about how I would be teaching the lesson. [...] I remember feeling slightly unprepared for my lesson.

- *Transfer between the student perspective and the teacher perspective*: connecting the student and the teacher perspective

Fiona: In my reflection I wanted... when playing the student role I'm very focused on how I felt as a student in the class [...] while the teacher was teaching the lesson. But I also felt it was important to consider from the teacher's [perspective], if I was the one teaching this lesson and I know my student, and this and this is my role, how would I have improved the lesson?

Participants described transfer in the different reflection and feedback phases. For example, when designing class profiles and student roles, participants were thinking about the needs of different students and how they can adjust teaching to their needs. When playing the roles, although they were often in the student's shoes, they sometimes were reflecting on how that experience informs teaching. This was especially apparent when the role was different from their own experiences as students:

Anna: It was also hard to play it, because the teachers were from the US. And they suppose that I have other understanding of the terminology and of the topic. [...] It could happen not only abroad, not only in another curriculum. It could happen, probably

with other teachers as well, that for instance, if I have a new student in a school who went to another school before that, I shouldn't take it for granted what they know or what they should know.

Quantitative results from the interviews and the questionnaire

Table 1 shows code frequencies of stages of awareness and transfer in interviews, and the averages of answers to the questionnaire in the ten phases. Stages with the largest code frequencies out of 77 codes are *role-playing students* (21), *designing student roles* (16), *designing lesson plan* (12), and *teaching the lesson* (10). Stages with highest values for student perspective in the questionnaire on a scale -3 to 3 are *role-playing students* (2.0), *reflection on playing a student role* (1.2), *designing student roles* (0.5), and *feedback from participants from the perspective of their student roles* (0.4).

Table 1: Code relation table and questionnaire averages

	NUMBER OF CODES IN INTERVIEWS					SUM	AVERAGE PERSPECTIVE IN QUESTIONNAIRE Teacher (-3) to Student (3)
	Student shoes	Awareness of student perspective	Empathy for students	Adjust teaching to student needs	Transfer student perspective to teacher perspective		
Designing the school and the class in general	0	0	0	0	0	3	-0.3
Designing specific student roles	1	0	0	4	1	16	0.5
Designing lesson plan	2	0	0	4	0	12	-0.4
Teaching the lesson	0	0	0	3	0	10	-1.2
Oral reflection right after your lesson in class	0	0	0	0	1	2	-0.8
Feedback from participants from the perspective of their student roles	0	1	1	1	0	5	0.4
Feedback from participants from a teaching perspective	0	0	0	0	0	2	-1.1
Role-playing students in lessons of group members	8	0	2	0	6	21	2.0
Writing a reflection on you own lesson	0	0	0	0	2	0	-0.7
Writing a reflection on playing the student role	0	0	0	0	4	6	1.2
SUM OF ALL PHASES - CODES / AVERAGE OF ALL PHASES - PERSPECTIVES	11	1	3	12	14	77	0.0

Discussion

Viewing the results through Blömeke et al.'s (2015) framework on teacher knowledge, the three stages of awareness of the student perspective align with the three situation-specific skills:

1. *Perception: identifying with the student*, which most frequently occurred when *role-playing students* (9), gives participants access to a very close perception of the student described by the role. Participants will need to be able to *perceive* students in their own teaching contexts from a teacher role in the future. The following two components of the task connect role-play to the teacher perspective, hence sensitise participants to perceive students in their target teaching context:
 - *Identifying* with different student roles through role-play and *transferring* these to a teacher perspective through reflection.
 - *Transferring* the experiences other participants have when role-playing students in their lesson through reflection, that relate to their own teaching context as described by the *role-play vs reality* theme.
2. *Interpretation*: in the context of knowledge about the student perspective, *interpretation* aligns closely with *understanding the student perspective*, hence all the different instances where participants grow in this respect build on their disposition to be able to interpret their perceptions

of students' needs in their target classrooms, especially when this is catalysed by the *role play vs reality* aspect and *transfer*. Understanding the student perspective most frequently occurred when *role-playing students* (6), *designing student roles* (4) and *receiving feedback from participants from the perspective of their student roles* (3).

3. *Decision making*: this aligns closely with *adjusting teaching to students' needs* in the given context, which most frequently occurred during *teaching* (11), *designing student roles* (10), and *designing the lesson plan* (9).

The *conflict between the student and the teacher perspective* shows the challenge of being aware of the student perspective while being in the teacher perspective. To be able to take the student perspective into account, teachers need to constantly go back and forth between the different levels (Liljedahl et al., 2009), and that is why *transfer between the student perspective and the teacher perspective* is crucial. *Transfer* most frequently occurred when *role-playing students* (6), *writing a reflection on playing a student role* (4), and *writing a reflection on their own lesson* (3).

There is no space to analyse the results of the questionnaire, but taking a glance at the sum column of the code values and the result column of the questionnaire in Table 1, we can see that there are constant shifts of perspective from phase to phase, and also a correlation between the two columns.

Conclusion

The aim of this study was to examine how designing and playing specific student roles in a microteaching task complemented by multiple phases of reflection on role-playing students adds to teacher learning. The research question was: *What do participants learn about the student perspective during the microteaching task with an added focus on role-play, and how does this knowledge evolve during the different components of the task?* Thematic analysis of the interview results identified three stages of awareness about the student perspective: (1) *identifying with the student*, (2) *understanding student needs*, (3) *adjusting to students needs*. Evidence for a *conflict between the student and the teacher perspective* highlights the challenge of moving between these stages. *Transfer* between the stages and a certain amount of semblance to the target teaching context as described by the theme *role-play vs reality* help participants adjust to students' needs in their own context. Awareness of the student perspective was most present during *role-playing students* and *designing student roles*, while *transfer* most often happened during *role-playing students* and *reflection* phases.

A limitation of the study: interpreting the number of codes should be handled cautiously because of (a) the small sample size (b) phases were discussed in the interviews only if it was closer to the student perspective or in the middle according to the participants' reply to the questionnaire. In a future study it would be interesting to discuss all phases for all participants.

Future research may involve analysing written reflections and recorded lessons. It would also be interesting to focus more explicitly on Guided Discovery and its relation to the student perspective.

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