

## Article

# Storylines from Newcomers' Perspectives: The Complexities of Learning Mathematics in a Norwegian Introductory Class

Shanthi Gretta Pasanha <sup>1,\*</sup>, Annica Andersson <sup>2</sup>, Beth Herbel-Eisenmann <sup>3,4</sup> and Anita Movik Simensen <sup>5</sup>

<sup>1</sup> Department of Mathematics and Science Education, Faculty of Humanities, Sports and Educational Science, Campus Vestfold, University of South-Eastern Norway-USN, 3184 Borre, Norway

<sup>2</sup> Department of Mathematics and Science Education, Faculty of Humanities, Sports and Educational Science, University of South-Eastern Norway-USN, 3679 Notodden, Norway; annica.andersson@usn.no

<sup>3</sup> College of Education, Michigan State University, East Lansing, MI 48823, USA; bhe@msu.edu

<sup>4</sup> College of Natural Sciences, Michigan State University, East Lansing, MI 48823, USA

<sup>5</sup> Department of Education, Faculty of Humanities, Social Sciences and Education, UiT, The Arctic University of Norway, 9510 Alta, Norway; anita.m.simensen@uit.no

\* Correspondence: shanthi.g.pasanha@usn.no

**Abstract:** This paper investigates storylines from newcomers' perspectives on their experiences of learning mathematics in an introductory mathematics classroom setting in Norway. We engaged in participatory research at a school over time. The data in this article come from observations and conversational interviews. Positioning theory guided our analysis in identifying storylines and related positionings. Our analysis provided us with the following four storylines: (1) newcomers find mathematics easy because they are also learning a new language; (2) newcomers experience tensions when learning mathematics in a new language; (3) newcomers find math teachers extra kind and find that they extend their help to them more than usual; (4) newcomers seek alternative resources for learning advanced mathematics. The identified storylines serve as a valuable resource to understand the newcomers' wishes and desires for their mathematics education in a context of not yet knowing the language of instruction and educational culture. We recommend listening to newcomers' perspectives of their experiences and recognizing the strengths they bring to the classroom to understand how they navigate their situation while learning mathematics in multilingual mathematics learning settings.



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## 1. Introduction

Recent issues related to the pandemic, global warming, poverty, and political unrest have forced people to leave their countries and their beloved culture and heritage and migrate to safer places, causing a massive surge in students who may not know the host country's dominant language in the host country's schools. Thus, "teaching in today's multilingual/multicultural classrooms should focus on communicating with all students and negotiating challenging academic content with all of them by building on their different language practices, rather than simply promoting and teaching one or more standard languages" (García & Sylan, 2011, p. 385). Language plays a crucial role in classroom communications and in the teaching and learning of subjects like mathematics. Studies on bilingualism (Clarkson, 2006; Moschkovich, 2002, 2006; Norén, 2008; Planas & Gorgorió, 2004) and recent studies on multilingualism (Barwell, 2016; Halai & Clarkson, 2016; Phakeng, 2016) emphasize the importance of immigrant students' home languages as a resource in learning

mathematics, especially in their early years of immigration. Yet host countries prioritize teaching and learning their official languages, positioning multilingual students' home languages as devalued, taking an assimilation view (Setati & Planas, 2012), which is purely political in nature. This political power of ignoring the newcomers' first or home languages pressures language minority students to learn mathematics in their host country's dominant and official languages. This happens in many countries and languages, for example, Greek in Greece (Stathopoulou & Kalabasis, 2006), English in the USA (Moschkovich, 1999), Spanish in Catalonia (Gorgorió et al., 2002; Planas & Setati, 2009), and Swedish in Sweden (Svensson Källberg, 2018; Norén & Andersson, 2016). In Norway, the Norwegian language dominates classroom interaction and the learning of mathematics in introductory classes.

This article investigates the storylines shared by newly arrived migrant students (hereafter newcomers) during their interviews about their experiences in an introductory mathematics class. Newcomers, according to McBrien (2022), are those "who have recently arrived in a country that is likely to be different from their homeland in ways that include culture, how social interactions occur, and language" (p. 7). Positioning theory focuses on how storylines—or "ongoing repertoires that are already shared culturally or invented as participants interact"—underlie ways of interacting and are used to position people as we interact. Storylines become resources as they expose messages hidden in stories. They can help mathematics educators to understand messages about mathematics and how those messages seem to be practiced implicitly or explicitly in society. Therefore, it is important to identify storylines hidden in the stories newcomers tell from their own perspectives to explore what they think about learning mathematics when they participate in the introductory class.

### 1.1. Research Context

For a more rapid integration of newcomers into the school system, Norway offers an introductory program with the goal that newcomers learn Norwegian as quickly as possible so they can move into classes that follow mainstream education (Norwegian Ministry of Education, 2024a). Engen (2010) emphasizes that linguistic minorities need to become literate in the official language, as it is important for their self-advancement. Similarly, Civil (2012) mentions that not knowing the official language of instruction can become an obstacle to the teaching and learning of mathematics for immigrant students. Hence, society prioritizes that these students learn the language of instruction as quickly as possible. For newly arrived migrant students, the introductory classes become the first meeting point of the Norwegian school system and a place where they learn the national language and culture.

In this research, we explore storylines from a group of newcomers aged 12 to 16 years who are enrolled in an introductory class in Norway. In recent years, schools in Norway, like many other schools in Europe, have become linguistically more diverse (Engen, 2010; Hilt, 2017; Krulatz & Iversen, 2020; Norozi, 2019). Today, about 17% of the Norwegian population is immigrants (Statistics Norway, 2024), and about 20% of school-age children are of immigrant background, either as immigrants themselves or born in Norway to immigrant parents (Khilji & Xenofontos, 2024). Newcomers are a very diverse multilingual group (Barwell, 2016). The school we focus on, for example, includes students from over ten countries (e.g., Afghanistan, India, Congo, the Philippines, the United States), each speaking two or more languages (e.g., Arabic, Chinese, English, French, Ukrainian) and having diverse educational backgrounds. The recent war in Ukraine has also added a new wave of newcomers to this group. Due to a huge variation in mathematics experience and knowledge, classes for newcomers were divided into two groups. The interview data

presented here come from one group. We name it Group A. More details about the research context are provided in the Section 3.

The following questions guide our study:

1. What storylines can we identify from interviews with newcomers in which they talk about their experiences of learning mathematics in an introductory class?
2. How do they position themselves in relation to the identified storylines?

### 1.2. Students' Experiences of Learning Mathematics

Allowing students to share their stories can shed light on their experiences of learning mathematics. Their stories can reveal their emotions, such as feeling overwhelmed when the methods taught at school conflict with the methods practiced at home (Lange & Meaney, 2011) or how being transferred from one class to another impacts their perception and learning of mathematics (Lambert et al., 2022). Additionally, students' stories can shed light on gender bias in the classroom, where girls need to be positioned as clever but not to be seen or act as such (Foyen et al., 2018). Some stories also highlight how students' attitudes towards math changed as the contexts of learning mathematics changed (Andersson et al., 2015). Furthermore, some students' stories illustrate how students actively participate during group activities (Hintz, 2011). By listening to students share their experiences, mathematics teachers have come to realize the importance of understanding their perspective.

Jhagroo (2015) studied the experiences of ten immigrant students in New Zealand for whom the dominant classroom language was different from their home language. The study showed how language-related challenges shaped immigrant students' beliefs about their (in)ability to learn mathematics, causing them to feel if they were not good at mathematics in a secondary school mathematics classroom. Svensson Källberg (2018) investigated immigrant students' opportunities to learn mathematics in a Swedish context. The findings of her study indicated that immigrant students talked about lacking "Swedishness", feeling "othered", or being segregated. Such feelings of exclusion affected their opportunities for future plans. Gorgorió et al. (2002) interviewed immigrant students to understand their transition experiences to mainstream classes in Catalonia, Spain. Their findings indicated how non-school-related knowledge that students brought to the classroom could create cultural conflicts and hinder immigrant students' learning of mathematics. Similarly, Takeuchi et al. (2019) interviewed students who immigrated to Canada as children after the age of 9 and highlighted how they liked to learn mathematics with their friends or people who spoke the same language. These studies highlight the tensions and psychological trauma immigrant students may undergo when learning mathematics in a new language.

### 1.3. The Norwegian Context

Some of these findings have also been identified in the Norwegian context. For example, newcomers felt safer and felt a stronger sense of belonging in introductory classes than they felt in mainstream classes in Norway (Chinga-Ramirez, 2017; Mathisen, 2020). Other studies, such as Hilt (2017), showed that newcomers felt excluded from mainstream classes. Burner and Carlsen (2017) reported that newcomers used online applications such as Google Translate to learn English and helped each other using their pre-existing multi-linguistic skills. Yet, Burner and Carlsen underlined that the benefits of the diversity factor in the English classroom are seldom highlighted in present research in Norway.

A study conducted by Nortvedt and Wiese (2020) showed how four lower secondary school mathematics teachers adapted their teaching and assessment practices in classrooms in relation to migrant students. The findings indicated mathematics teachers viewed migrant students as the same as Norwegian students, ignoring their cultural differences.

Hence, their study highlighted the importance of paying attention to the cultural differences migrant students bring to the classroom. Although Nortvedt and Wiese's study focuses on teachers' perspectives in a mainstream mathematics classroom setting, they show that cultural differences invariably exist in the mathematics classroom. Thus, this needs to be addressed in the Norwegian mathematics research context.

For newcomers, the introductory class is the first meeting point of the Norwegian education system (Norozi, 2019). This is where they begin to learn the language and culture of Norway. Their experiences in the classroom can influence the decisions they make for their future as they adjust to a new educational system. In our study, we decided to gather the perspectives of newcomers from an introductory mathematics class. We found that there were no previous studies focusing on the mathematics learning experiences of newcomers in a Norwegian introductory classroom context. Therefore, we believe that our study will be the first to explore the perspectives of newcomers in an introductory mathematics class. The storylines emerging from the interviews will reveal hidden messages, which can become resources for educators in planning the teaching of mathematics to all multilingual students.

## 2. Theoretical Framework: Positioning Theory

Wagner and Herbel-Eisenmann (2009) point out that positioning theory focuses on the immanent instead of transcendent discursive practices; that is, it focuses on the experiences at the moments of action rather than the stable characteristics of individuals and discipline. Relevant to this article, the stories told in society about how a lack of language proficiency results in lower academic performance and vice versa can position migrants as a problem, rather than, for example, pointing to outdated educational policies or insufficient resources. Migrant students influenced by such societal myths or storylines may find themselves in a vulnerable position. Hence, understanding the socially shared storylines from what students themselves say is important. Positioning theory offers a lens to analyze the socially shared storylines that appear in momentarily constructed interactions (Herbel-Eisenmann et al., 2015)—in this case, in interviews with migrant students who have experienced introductory mathematics classes.

### 2.1. Positions, Communication Acts, and Storylines

Positioning theory focuses on three interconnected concepts—positions, communication acts, and storylines. In contrast to the more commonly used fixed idea of “role”, B. Davies and Harré (1990) use “positioning” to refer to “the discursive [and fluid] process whereby selves are located in conversations as observably and subjectively coherent participants in jointly produced storylines” (p. 49). A “position” in a conversation is a metaphorical concept that describes a person's moral and personal qualities as a speaker. It is a cluster of beliefs concerning the rights and duties of members of a group of people to act in specific ways (Harré, 2012). For example, one can position oneself or be positioned as powerful or powerless, confident or apologetic, dominant or submissive, authorized or unauthorized (Harré & van Langenhove, 2010). In mathematics classrooms, researchers have described students being positioned as expert or non-expert (Esmonde, 2009) or as “kinds” that can position students as competent or non-competent (Anderson, 2009). We encounter positions as relational and reciprocal, in that for one to be positioned as powerful, others must be positioned as powerless (Harré & van Langenhove, 1999). Thus, positioning and positions are interconnected and dynamic in nature.

“Communication acts” are the spoken, written, or semiotic resources used in human communication (e.g., utterance, gesture, gaze, proximity, style of argument) to understand the meanings that are mutually constructed during an interaction (Herbel-Eisenmann et al., 2015).

For example, teachers sometimes use the word “they” to refer to the textbook when they want to position themselves as aligned with the students and distance themselves from the textbook (Herbel-Eisenmann, 2009). Another instance related to teachers’ authority is when teachers use “I want you” or “what I want you to do is”, evoking an expert guide storyline, wherein they position the students as inexperienced followers (Herbel-Eisenmann & Wagner, 2010).

“Storylines” refer to narrative conventions, some explicit and some implicit, which are “lived stories for which told stories already exist” (Harré, 2012, p. 199). Storylines, positions, and communication acts are interconnected, serving certain messages (Rodney et al., 2016), and the underlying message is considered a storyline (Esmonde, 2014). According to Edelen et al. (2022), storylines do not unfold in random ways but instead follow a practiced and established pattern of interactions, locating the positions of actors (e.g., students, teachers, principals, newcomers, migrants) in social situations. We assume that these established practices could be connected to local practices or to broadly shared practices in similar contexts. Migration is a broadly shared global context, and the storylines shared about migrants in the media, for example, can influence the actions people take in local contexts. How students act and position themselves in the classroom can be shaped by students’ socialization through these messages. For example, the storylines that appear in news media can affect “students’ relations with and expectations of mathematics education and thereby their opportunities for mathematics learning and ultimately their future prospects” (Andersson et al., 2022, p. 324). Though students have the right to learn mathematics according to their ability, in adaptive learning (Tiplasset opplæring) in the Norwegian curriculum (Norwegian Ministry of Education, 2024b) it is common for newcomers to learn mathematics and Norwegian language within the context of the introductory class. Hence, what is said and practiced globally can also influence individuals in the local contexts.

Kayi-Aydar (2021) separates storylines into two types. One type includes “broad, culturally and morally constructed, taken-for-granted storylines. These storylines typically build on dyadic relationships, such as teacher-student, oppressor-oppressed, or mother-daughter, and guide individuals as they go about their lives every day” (p. 3). In our paper, for example, Shanthi, the first author, and newcomer students voluntarily entered into the researcher-participant storyline because, in a research context, this is a culturally shared storyline. The second type of storylines are the ones which emerge out of the interactions in the interviews. These are momentarily constructed and culturally and morally shaped as the conversation unfolds (Kayi-Aydar, 2021). In this article, we focus on the second type of storylines—ones that emerged during the interviews.

## 2.2. Positioning Theory and Multilingual Students

Positioning theory is useful in understanding “the second/foreign language learning and teaching processes” (Kayi-Aydar, 2019, p. 44) as it can illuminate one’s rights to access multilingual contexts in learning subjects such as mathematics. “Teachers and students use language to position themselves and others” and “if students are positioned as incompetent, their contributions may be ignored and discarded. If they are positioned as experts or highly knowledgeable, their contributions will be given greater weight” (Chval et al., 2021, p. 11). Further, Chval and colleagues argue that if the activity in the classroom focuses on improving students’ language competency, assuming that they are not ready to learn mathematics, then multilingual learners are denied the opportunities to develop mathematical competency. For example, using positioning theory and multimodal analysis to examine the strategies for integrating language and content for third-grade Latina/o English learners in a mathematics classroom, Pinnow and Chval (2015) have shown how an emergent bilingual student’s interactional competence is “inextricably inter-



twined with the positioning practices of the classroom interactional architecture” (p. 10). Therefore, being vigilant of the positioning that happens during classroom interactions and the planning activities that position language learners as competent is important to support the language learners to build their mathematical competency, which includes both building on their previous mathematical knowledge and developing the mathematical language for fruitful mathematics classroom communication.

### 3. Methodology

#### 3.1. Research Design and Research Context

This research is part of the Norwegian Research Council (NFR)-funded research MIM: Mathematics Education in Indigenous and Migrational Contexts (see <https://www.usn.no/mim> (accessed on 5 January 2025)) which uses participatory research (see, for example, [Groundwater-Smith et al., 2014](#)) to investigate the storylines of students, teachers, school leaders, and community members with the longer-term goal to co-develop strength-based pedagogies.

In this paper, we present the perspectives of newcomers from 12 to 16 years of age who attended newcomer classes, previously known as “mottak” (reception class) and now named “innføringsklasse” (introductory class). The introductory classes offer subjects including Norwegian, Mathematics, English, and Social Sciences, among others. The mathematics class in the introductory class was divided into two groups, A and B, based on their performance in the mathematics mapping test (kartleggingsprøve). Group A performed better on the test than the other group, being rated from “varied” to “excellent”, and hence followed the lower secondary school syllabus. Group B followed primary school mathematics. Both groups had mathematics lessons at the same time, and they were conducted simultaneously in two different classrooms by two teachers. Therefore, the first author followed one class consistently, that is, Group A.

##### 3.1.1. Participants

Students in Group A came from more than ten countries and spoke two or more languages. In Group A, 75 students participated in the three-year observation period. A total of 45 students were interviewed, including 5 who were interviewed twice. Table 1 provides information about the number of students in the class, their country backgrounds, and the year they were interviewed.

Some of the students who consented to participate while in the introductory class were transferred to mainstream classes during the observation periods. They were interviewed while in the mainstream class if they chose to share their experiences.

During the first year of interviews, the participants were a mixed group of children of refugee and migrant parents with good education backgrounds. In this group, many students had good proficiency in the English language and hence English was used to support students’ mathematics learning. During the second year, the Ukraine war influenced an influx of refugees into the introductory class and thus to our data collection. During the third year, this trend continued, but there were newcomers from other countries, too. Unlike previous years, many of these newcomers had a good educational background, either from their native country or from the countries they had resided in after they were displaced from their home country. The background experiences shared by these participants impacted the storylines that emerged.

**Table 1.** Overview of newcomers and participants in Group A over the course of 3 years.

Newcomers' Home Countries	Number of Students in the Class, 2021–2024	Number of Students Interviewed (First Interviewed Year); No. of Students Interviewed Twice (Second Interviewed Year)
Afghanistan	7	2 (22–23)
Brazil	1	1 (22–23); 1 (23–24)
China	1	1 (23–24)
Eritrea	2	2 (1 in 22–23; 1 in 23–24)
Finland	1	1 (21–22); 1 (23–24)
India	2	2 (1 in 21–22; 1 in 23–24)
Indonesia	2	1 (21–22)
Iran	1	1 (22–23)
Congo	4	3 (2 in 21–22; 1 in 23–24); 1(22–23)
Mexico	1	0
Poland	1	1 (23–24)
South Sudan	3	1 (22–23)
Switzerland	1	1 (22–23)
Somalia	1	1 (21–22)
Spain	2	0
Syria	6	5 (3 in 21–22, 2 in 22–23)
Thailand	5	3 (2 in 21–22; 1 in 22–23)
Turkey	1	1 (22–23)
Philippines	7	5 (4 in 21–22; 1 in 23–24); 1(23–24)
United Kingdom	1	1 (21–22)
United States of America	2	2 (21–22)
Ukraine	21	9 (8 in 22–23, 1 in 23–24); 1(23–24)
Yemen	1	1 (22–23)
Total	75	45 (interviewed once); 5 (interviewed twice)

### 3.1.2. Participatory Observations

Shanthi visited the class once a week for 48 weeks and participated in classroom activities during mathematics lessons. As a classroom assistant, she helped share worksheets, assisted in problem-solving processes, and translated information into English during lessons. She got to know the students well. Sometimes, she assisted the teacher in classroom activities and encouraged more classroom conversations by asking follow-up questions and providing some context-related examples that could support connections to the students' home countries. At other times, she invited the students to use their mother tongue to understand the concepts and allowed them to discuss the ideas with students from the same language background. In doing this, she hoped the students would connect Norwegian mathematical terminology to their primary/former education language. Shanthi and the teachers had informal meetings before and after the lessons to provide information about the day's topic and discuss ideas about lesson plans. These participatory observations became the basis for the interviews.

### 3.1.3. Interviews

The interviews were conducted through conversational semi-structured interviews (Potter & Hepburn, 2005; Brinkmann & Kvale, 2015). The interview protocol followed

the MIM project (guide and was adapted to the present context. Some of the main areas of focus during the interview were related to students' background (name, country of origin, duration of stay in Norway, family members in Norway); students' perspectives (personal and family members) on mathematics; what students thought about the different approaches they used for learning mathematics (what they did when they got stuck while solving problems); what they thought about the mathematics classroom (their learning experiences in their home country and in the introductory class, their participation in classroom activities, their use of language and collaboration with classmates); the role of the mathematics teacher (examples of a good teacher, their suggestions for math teachers); and students' wishes for the future and desires for learning mathematics in the introductory class. These areas provided a starting point for the conversations, and follow-up questions were asked depending on their responses. The interviews were conducted in English and/or Norwegian, which shaped and influenced the resulting information. Google Translate was used in several cases to assist students in translating the questions into their mother tongue. This helped students understand and reply in their mother tongue. The duration of interviews lasted for about 20 to 30 min on average during the first two years. In the third year, the interviews lasted for about 45 to 50 min. Most of the interviews were conducted one-on-one, except for two, which were conducted in pairs. All the interviews were audio-recorded.

#### 3.1.4. Data Collection

The main data come from the audio-recorded interviews. All the audio recordings were then transcribed verbatim and analyzed later.

### 3.2. Ethics

The guidelines given by the NESH: National Committee for Research Ethics and Social Sciences and Humanities (NESH, 2024) were followed when conducting this study. Shanthi took part in parent–teacher meetings during the autumn semesters of 2021 and 2022 to inform the parents about the project and her participation in it. The translators present during the meeting helped to inform the parents about the project, Shanthi's participation, and the data collection process. Parents were also informed about data confidentiality. Newcomers are already a marginalized group in the host country. To prevent further marginalizing these students, their names, their countries of origin, and their mother tongues were anonymized. This was done to avoid stereotyping the participants and making them even more vulnerable in society (Andersson & le Roux, 2017). Students were informed that their participation was completely voluntary, and they were free to say "No" at any time. Two students used this opportunity to withdraw from participating in interviews.

### 3.3. Reflexivity

#### 3.3.1. Reflexivity During Data Collection

In this study, Shanthi's personal experience as an immigrant, mathematics teacher, and now a researcher (see Pasanha, 2023) played a crucial role in the research process. In sharing her experience as a language learner, Shanthi encouraged newcomers to share their stories. "The actors' reflexive consciousness is in being aware of themselves as subjects and as objects of others' awareness: in other words, the actors' capacity to experience both the self and the other" (Whitaker & Atkinson, 2021, p. 43). Shanthi conducted all the interviews and made participatory observations. Her experience as a Norwegian language learner became a great source of support for her while conducting these interviews. She revoiced the students' answers to confirm that she understood them correctly. She invited the students to use Google Translate when they struggled to explain their answers in Norwegian. Also,



her experience of transitioning between English and Norwegian helped newcomers to use a similar method when they struggled to find the words in Norwegian. Though the revoicing and repeating of answers helped Shanthi to receive clear answers from the newcomers, she was aware of the influence these methods had on the interviews. So, in the third year, she used an improved interview protocol, which included more open-ended questions. Here, Shanthi reduced the use of revoicing and provided more time for the interviews. For example, while for the first two years, the interviews typically lasted 20 to 30 min, the third year's interviews lasted about 50 min on average, providing more time for the students to think and reflect on their answers.

### 3.3.2. Reflexivity During Analysis

Reflexivity also includes differentiating the researcher's voice from the participant's and bringing forth the students' perspectives through storylines. In identifying storylines, we first acknowledged the culturally shared, taken-for-granted researcher-participant storyline, which positioned the first author as the one with the right to ask questions and the newcomer as the one with the duty to answer. This was guided by research ethics, a moral landscape (Kayi-Aydar, 2021), and the relationships that developed when Shanthi was a participant observer in the introductory classroom.

Reflexivity is turning back to oneself (Davies, 2008) and reflecting on how the researchers' experiences affect the research that they are conducting and writing about (Andersson & le Roux, 2017). To avoid bias in the selection of storylines, we drew on our strengths of having multiple lived and educational experiences. All four authors individually read the data and looked carefully at each other's analyses. We discussed the identified storylines and the supporting evidence in multiple meetings. In addition, we talked in depth about the data in the larger MIM research group meetings.

In our research, we present examples of newcomers coming from various countries and with different language backgrounds. Their only common feature was that they were all Norwegian language learners. Hence, the storylines in this paper reflect the experiences of diverse groups of newcomers, offering a wide range of perspectives from students.

### 3.4. Analysis: Identifying Storylines

Storylines are either culturally shared or locally constructed narratives that emerge when participants interact. In our case, conversational interviews were used to develop the interaction between the newcomers and Shanthi, and storylines emerged in the conversations. To identify storylines, all co-authors read the transcribed interviews multiple times and highlighted the episodes that included a newcomers' positioning of themselves and others in relation to mathematics and any mathematics-related episodes. Here, "episodes" refer to the specific contexts that newcomers draw on to describe their positioning. For example, episodes about newcomers' personal perspectives towards mathematics (whether they like/dislike or are neutral about mathematics, whether they find math learning relaxed/easy/difficult/boring, exciting, fun, etc.); reflections on mathematical content, description of their teachers, pedagogies, and teaching methods, and episodes expressing their desires for mathematics learning and seeking information on how to use different resources to learn mathematics while learning a new language. After reviewing all these episodes, we identified five that the students often mentioned in relation to mathematics, and we color-coded them into five respective groups: newcomers positioning their personal attributes; positioning mathematics teachers and their teaching; positioning mathematical content; newcomers expressing their wishes and desires for mathematics learning; and newcomers navigating between different learning resources to learn mathematics. Here, the word resource is used as a noun that refers to different multimodal artifacts, such as

books and lessons from their home country, the internet, or other digital helping tools that were used. Some of the identified episodes were dependent on the interview protocol and some had emerged from the students' stories. We did not include episodes that, for example, described their reasons for moving to Norway, information about their families, or descriptions about their countries and classroom norms.

In the next step, all same-colored episodes were grouped together under their respective colors. This helped us see the episodes related to introductory and non-introductory classes. We then selected only introductory class-related episodes for these five groups. In these narrowed-down episodes, we focused on mathematics and looked for the verbs or actions the students used to describe their experiences and how they positioned themselves and others in relation to the introductory class. For example, maths here [Introductory class] is such an easy subject, I liked the subject in my home country (pseudonym), or I think teacher D is a nice mathematics teacher because she can explain if you don't understand, and you don't feel that kind of pressure. In the first example, we see the newcomer positioning mathematics as an easy subject and how they liked it better in comparison to their experience in their home country. In the second example, we see the newcomer positioning the math teacher as a good and nice teacher, as she explains problems to students if the math is not understood. Therefore, the student feels less pressure.

Then, we looked for themes that appeared consistently within the same-colored groups. Here, themes are topics that relate to the same/similar issues. For example, themes that discuss how newcomers perceive mathematics as an easy/relaxing/difficult subject, language as a problem, or the teacher as a kind/good/nice person, etc. The most frequent themes were noted, and the respective episodes were regrouped under each theme.

Further, we looked at the examples under each theme and determined what they told us. We constructed statements that conveyed the same/similar messages. For example, we constructed statements that said "mathematics is easy because newcomers learn/repeat the same material as they did before" or "mathematics is easy/difficult but language is a problem", "teachers are kind and they help newcomers", and so on.

Finally, we wanted to see what messages were emerging within and across the different episodes; we therefore collected all the statements under each episode (Table 2). Here, we observed that the same or similar messages were appearing in different episodes. Examples include messages about "how newcomers compromise mathematics learning because of language learning", about "the teachers' personal attributes influencing newcomers, about newcomers' strengths and wishes", and messages about *the tensions they feel* when learning mathematics in a new language.

We saw the same/similar messages emerging across statements in different episodes. For example, in the above statements, we see newcomers feeling that learning mathematics is basic, simple, and repetitive, and they wish to learn more complex mathematics. Language-related issues also appeared often. So, we color-coded the same/similar themes within these statements. Then, we zoomed out from these same-colored statements to find the main messages newcomers tried to convey, which became the storylines. We found four such storylines:

1. Newcomers find mathematics easy because they are also learning a new language.
2. Newcomers experience tensions when learning mathematics in a new language.
3. Newcomers find math teachers extra kind and find that they extend their help to them more than usual.
4. Newcomers seek alternative resources for learning advanced mathematics.

We see that the storylines are interconnected, and several of them can appear in the same example.

**Table 2.** Example analyses showing the process of constructing storylines.

Categories of Episodes in Five Groups	Newcomers Positioning Their Personal Attributes	Positioning Mathematics Teachers and their Teaching	Positioning Mathematical Content	Expressing Their wishes and Desires for Mathematics Learning	Navigating Between Different Learning Resources to Learn Mathematics
Examples of positioning oneself and others	1. Math here is an easy subject. I liked [the] subject in my home country, but I am not so good at mathematics, but here understand all 2. Of course, math here is easy but the language is hard (...)	1. They [teachers] come and help you. If you say you can't do it, they will say that's ok. 2. [If] you ask for help or [ask] questions, they can immediately talk to you	1. I feel like sometimes I remember I have done it before when I was in another country 2. I Norge lærte vi tema I hjemlandet lærte kanskje i 5. trinn, ja veldig lett (In Norway we learn the topic that we learned perhaps in 5th grade in home country, very easy)	1. Jeg vil ha mer matematikk (I want [to learn] more mathematics) 2. Jeg vil lære litt videregående matematikk (I want to learn upper secondary school mathematics)	1. At home I watch this one guy math antics 2. I have the book for 10. grade I learn and try to solve the problems from there
Emerging themes	1. Math here is an easy subject. I liked [the] subject in my home country but I am not so good at mathematics, but here understand all 2. Of course math here is easy but the language is hard. (...)	1. Teachers and their personal attributes as an important aspect of teaching 2. Language is hindering learning	1. Repetition of the same content 2. Content is easy and basic 3. Language is a problem	1. Wishes related to learning more complex mathematics 2. Wishes related to languages	1. Newcomers use internet resources to understand mathematics in their mother tongue 2. Newcomers follow their home country's lessons online
Statements	Newcomers find math easier in the introductory class. They feel repeating content okay, but sometimes it can be boring.	Teachers in the introductory class are extra kind and extend their help more than usual to students who are learning mathematics.	Newcomers feel that they are learning basic mathematics, which they find very easy.	Newcomers wish to learn more/difficult/complex/new mathematics because they find they are repeating the same old things.	Most of the students use the internet as a resource to learn (and to understand) mathematics in their mother tongue when they wish to learn more.

### 3.5. Identifying Positionings

According to [B. Davies and Harré \(1990\)](#),

Positions are identified in part by extracting the autobiographical aspects of a conversation in which it becomes possible to find out how each conversant conceives of themselves and the other participants by seeing what position they take up and in what story, and how they are positioned. (p. 50)

Therefore, we noticed how newcomers described their personal qualities in relation to introductory mathematics class-related episodes to position themselves and others. We looked for phrases that included nouns and verbs to see how the positioning occurred. We sought any “utterances, clues in word choice or associated actions that evoke images of known storylines and positions in that story” ([Wagner & Herbel-Eisenmann, 2009](#), p. 1). For example, “[If] you ask for help or questions, they [teachers] can immediately talk to you” is one of the episodes from an interview where we see how a newcomer positions himself and the teacher. The newcomers’ chosen verbs explain what they do, i.e., asking for help or asking questions when needed, and how the teacher responds immediately. This indicates the student’s position and that the teacher as an easily approachable person.

In identifying positioning in storylines, we zoomed out from individual positioning and started to see how students positioned themselves in relation to the storylines that emerged in general. Then, we also looked for why questions ([Kayi-Aydar, 2019](#)) to see why they positioned mathematics and themselves the way they did in the conversations. For

example, when many newcomers mentioned mathematics is easy, we focused on what aspect of it being easy they described: the repetition of content, solving fewer problems, or the problems given not being challenging enough. So, we focused on their reasoning to see why they positioned mathematics the way they did in relation to these aspects.

Positions are dynamic in nature (Harré, 2012) and so are storylines. They are constructed in the moment in time and hence are immanent in nature (Wagner & Herbel-Eisenmann, 2009). Aligned with Herbel-Eisenmann et al. (2015), we acknowledge that there may be multiple storylines and positionings happening at once, depending on how one interprets them and their perspectives. Positioning theory is contextual in nature; therefore, our identified storylines and positionings are specific to the context we presented in this study, that is, to Group A (see Section 3.1.1) from an introductory class in Norway. Hence, these storylines and positionings may not be generalizable to all introductory classes in Norway. Yet, the interpretations we make in this paper are based on our experiences with and interpretations of students' perspectives and are hence trustworthy (Kayi-Aydar, 2019). We have provided some episodes from the interviews to show how the conversation unfolded during the interviews, thus bringing forth newcomers' perspectives to the readers in the following section.

#### 4. Results

In the following section, we discuss the four storylines and their respective positionings, along with some examples. We emphasize that in the examples, we present the transcripts verbatim as spoken by the students. Some examples contain mixed languages or words in Norwegian that are translated to English and are written inside brackets.

##### 4.1. Newcomers Find Mathematics Easy Because They Are Also Learning a New Language

The heart of the storyline is grounded in the fact that more than half of the newcomers stated that the mathematics they are learning in the introductory course is easier than they have previously experienced. So, we investigated how they elaborated on this easiness. We found that newcomers described the mathematics they were learning as basic, simple, and less demanding because they had to learn mathematics in a new language. We found that some of the students were willing to sacrifice learning more challenging mathematics to learn the Norwegian language, whereas some others wanted to learn more challenging and complex mathematics in the introductory classes.

In the following example, Fyona, who has experience in both the introductory and the "ordinary" classes, shares her experiences:

1. Shanthi: How do you find the transitions from mottak [introductory] to ordinary classes?
2. Fyona: I think it's better for me from mottak to the ordinary class because the subjects are my level. And in mottak the subjects were easier because we were learning the language and not the subjects. Because we were not learning anything, but in ordinary class I learn the language and something new simultaneously. So, I think it's better in the ordinary classes.
3. Shanthi: What about mathematics?
4. Fyona: I do not like mathematics at all, I do not have a problem with the language, but it is hard for me since I was a kid
5. Shanthi: I did not observe that in mottak (introductory class). You were doing pretty well in mathematics
6. Fyona: That was basic level. In my home country, I learned it when we were in maybe in 2nd grade of elementary school. So it is really easy for me

Later in the interview

7. Shanthi: And math here? The word problems and other math problems compared to your home country how do you find them here in Norwegian?
8. Fyona: They are easier except for the story type. For the story things you need a lot of understanding, what it wants you to do, solve and stuff. Sometimes I don't understand them and that's because of the language. I can't use Google because I am not allowed to use Google Translate [in the exam]. That's pretty much ok. (Fyona, November 2022)

Fyona underlines how the introductory class was more focused on language learning (see line 2). She positions herself as not liking mathematics (line 4), and yet finding mathematics easier in the introductory class (line 6) than in her home country. Shanthi's classroom observation became the basis of a follow-up question (line 5) during the interview to verify Fyona's comment that mathematics is "hard for me" (line 4). Shanthi observed Fyona participating actively and solving mathematics problems with enthusiasm when she was in the introductory class. In line 6, we see Fyona replying, "I learned it when we were in maybe in 2nd grade of elementary school", referring to mathematics from her lower primary grades, yet claiming nonetheless to have found mathematics hard since her childhood (line 4). For Fyona, easiness was related to learning mathematics from the lower grades, and hence at a basic level. It had nothing to do with knowing the language (line 4), as Fyona stated "I do not have a problem with the language". Her reply later in the interview specified that she had difficulties with the language of word problems. As she states, "sometimes I don't understand them and that's because of the language" (line 8). So, Fyona found the introductory course easier due to basic problems with less text, and in the mainstream classes, she had problems related to story problems and not being able to use Google Translate, but she valued that she was able to learn mathematics and the Norwegian language simultaneously.

For Pamela, mathematics learning in the introductory class is about repeating the mathematical content in Norwegian language:

9. Shanthi: I see you sit at the back [of the classroom] and do it [the mathematics] yourself independently
10. Pamela: Yea, since the teacher said that my skills are high, like it is more kind of repeat stuff  
At the end of the interview
11. Shanthi: Do you have any questions to ask?
12. Pamela: How does this math learning [look] in ordinary class?
13. Shanthi: All the teaching would be in Norwegian. The class would be larger than this. Are you curious about it?
14. Shanthi: Actually, I am curious about the topics they go with. Since in mottak [introductory class] its more for refreshing I think maybe just enhancing language (Pamela, February 2022)

When Pamela is asked about working on mathematics independently, she points out that the teacher positions her as a skilled student (line 10). Yet Pamela is curious to know about learning mathematics in mainstream classes (line 12). At the end of the interview, Pamela again confirms that they are "refreshing" content she has already covered and working on learning the language (line 14). Thus, she is repeating or recalling the mathematics learned before, but in a new language.

Some students who found mathematics easier than in their home countries suggested focusing first on the learning of the Norwegian language and then mathematics. For example, these episodes occurred with Iben:

First interview



15. Shanthi: Do you have anything to add?
16. Iben: I think in home country it is more advanced learning than here (Iben, May 2022)

#### Second interview

17. Shanthi: And you said language is challenging. Do you have any thoughts how math teachers can do it better for the students when there is a language problem?
18. Iben: (Thinking) It's hard. Give us more exercises about Norwegian
19. Shanthi: Like language-related not math-related?
20. Iben: Focusing on language first
21. Shanthi: So, you think it would be helpful for you?
22. Iben: If we know more languages then when we go to ordinary class, then you don't have to worry about they never explain to us. When we are in the ordinary class then only one worry about math but not about two things, math and Norwegian at the same times (Iben, November 2023)

So, during the second interview, Shanthi asked Iben for suggestions on how mathematics teachers can help with learning mathematics when it is taught in a new language. Her reply can be seen in lines 18, 20, and 22, where she emphasizes including more language-related content than mathematics. Thus, Iben positions language learning as a more important aspect than learning mathematics when she is a language learner. Iben's reply highlights the complexities of the introductory mathematics class, that is, learning language and mathematics simultaneously. Iben says that she has learned advanced mathematics in her home country (line 16); at the same time, she also emphasizes the importance of learning the language and how it can support her when she is transferred to the ordinary classes (line 22), indicating how different students wish different things and showcasing the challenges that teachers have to face when teaching this diverse group.

Fyona, Pamela, and many newcomers in our interviews found mathematics learning in the introductory class to be more repetitive, simple, and easy, thus showing how they have to compromise learning complex and advanced mathematics to learn a new language. Conversely, we also see that some students, like Iben, wished to learn the Norwegian language first and then mathematical concepts in the Norwegian language, thus introducing the idea of what to prioritize first, teaching mathematics or teaching language. We see that, in both cases, it is the newcomers who have to compromise their positioning as capable math learners to their positioning as language learners due to being newcomers in the country. Thus, the above-mentioned examples support the following storyline: newcomers find mathematics easy because they are also learning a new language.

#### 4.2. Newcomers Experience Tensions When Learning Mathematics in a New Language

Another storyline is that newcomers experience tensions when they have to navigate between different learning systems and teaching methods and shift between different languages. In our data, we saw that more than half of the students expressed that they experienced different kinds of tensions when learning in the introductory class. In some cases, the tensions were related to moving from one country's system to another; in other cases, the move from the introductory class to the ordinary class caused tensions for students. In Iben's example, she talked about the difference between learning and recording multiplication:

23. Shanthi: When you say advanced math and basic math what are your thoughts about it? How do you cope with the changes from advanced math to basic math?
24. Iben: I usually ask for help to understand more and the stuff and the basic math they are teaching us is the Norwegian way of learning like multiplying, they [in my home

country] usually go like downwards when write it but here [Norway] they usually go straight. That's weird for me to change the way of doing (Iben, November 2023)

In this example, we see Iben describing how she has to shift how she records multiplication to the Norwegian way, likely making it a more tense experience (line 24). This is stressful for Iben: not only does she find mathematics basic and simple but she also has to change her way of doing it, which causes her more stress. She is navigating between a new language and different methods of recording mathematics problems, and she acknowledges that learning mathematics is more about adapting to the host country's methods of doing mathematics than it is about learning mathematics.

Shifting between different languages is another cause for tension for many students who learn mathematics in Norwegian as their third, fourth, or fifth medium of instruction. For example, Cathrine is learning mathematics in Norwegian, which is her third language of instruction and fifth spoken language. Norwegian introductory class is her third school context. Her story underlines the tensions she goes through when shifting between different school systems.

25. Shanthi: What about mathematics? How do you feel about math?
26. Cathrine: Actually, in my [home] country it is normal for you to go in class which is dependent on your age. So, it [mathematics] was simple for me in my country. But when I moved to Country 2, I was in a class which was a little bit higher for me. So, they gave me some hard mathematics and I did not understand anything, and I get some low points and the teacher did not care about it. When I came here [Norway], they gave the mathematics which I understand. When the teacher explains to me, I understand. So, it is little bit of help for me to catch up. So, trying hard to understand
27. Shanthi: How do you feel learning math here [introductory class]?
28. Cathrine: I think it is little bit good and simple and sometimes it confuses
29. Shanthi: What is confusing?
30. Cathrine: Language. Something Teacher A tells in English, before I understand them but now, I have to translate it to Language 2 because I didn't even know omkrets (perimeter) in English (Cathrine, March 2022)

Line 26 illustrates Cathrine's shift between different mathematics learning contexts and systems and the tension it caused, as she says "trying hard to understand". Her example of perimeter in line 30 confirms the tension she goes through in connecting her knowledge in previous languages while maybe not having the specific mathematical language skills in English. Shanthi's class observation indicated that Teacher A used English along with the Norwegian language to support newcomers' mathematics learning. We assume that, for many newcomers, English was not their mother tongue but a language they had to learn to communicate in when moving between different countries. It was challenging for many newcomers to navigate between different languages and relate mathematical content to prior learning. As Cathrine states, "Something Teacher A tells in English, before I understand them but now, I have to translate it to Language 2 because I didn't even know omkrets (perimeter) in English". These comments from Cathrine clearly indicate her tension from not only switching between different learning systems but also navigating between different languages to recall what she knows from before. These kinds of tensions were also observed by Shanthi during her class observations, highlighting the complexity of learning mathematics in a new language and the tensions newcomers experience when navigating between learning systems.

Even when students were moving between the introductory and the ordinary class, we heard them express tensions. For example, we see Binny positioning himself as a confused learner, both a mathematics learner and a language learner, a complicated position to navigate.

31. Shanthi: Du har jo vært i mottak klassen tidligere og har begynt å gå på 10. trinn. Hva forskjellen har du merkert? (You have been in the introductory class earlier and now moved to the tenth grade. What difference did you find?)
32. Binny: Det forskjellen er at i mottak det var ikke mye tekst vi trenger ikke å lese, det er bra. Pluss, minus og gange. Men i vanlig klasse de har tekst, lange tekst og vi må lese. Noen ganger jeg forstår ikke hva skal jeg gjøre det er pluss, eller minus eller gange (The difference is in the introductory class there was not much text, and we did not need to read it. That was good. It was addition, subtraction and multiplication. But in the ordinary class they have long texts and sometimes I don't understand what I should do, add, subtract or multiply) (Binny, March 2022)

Binny found it challenging to understand when the mathematical problems contained longer texts in the ordinary class (line 32). In the introductory class, he found it easier as there was not much requirement to read the problems, as they were just addition, subtraction, or multiplication. Hence, we assume that Binny experienced tensions whenever he had to solve the text problems in the new language.

In the above examples, we found that students experienced tensions due to moving between countries and between classes. We see Iben finding it weird writing multiplication in the Norwegian way, Cathrine experiencing challenges in connecting the previous knowledge she has learned in different school systems and languages, and Binny finding it difficult to read and understand long text problems in Norwegian language. All these examples indicate how newcomers experience tensions when learning mathematics takes place in a language that is new to the students. This supports the following storyline: newcomers experience tensions when learning mathematics in a new language.

#### *4.3. Newcomers Find Mathematics Teachers Extra Kind and Find That They Extend Their Help to Them More than Usual*

Almost all newcomers shared that they find their mathematics teachers to be extra kind and helpful in comparison to their home country's mathematics teachers. Many newcomers described their mathematics teachers in their home country as strict and demanding, and, hence, mathematics learning was stressful in their home country. In the following example, Ella positions her teachers in her home country as strict and constantly monitoring her:

First interview

33. Shanthi: Tell me more about your learning experience in your home country?
34. Ella: In my country, actually, my teacher was very strict so, I was good at mathematics, I needed to be good. She was always coming to see me if I was doing mathematics because she knew it, I don't like it [mathematics] (. . .)
35. Shanthi: So, you like a strict teacher?
36. Ella: Yes, I think. Because then he won't give you the space to do other things instead of math's and in my country be my side to see what I am doing. Of course, she should be kind, but you need to do it, you need to try it if you don't understand it, I will explain you ten thousand times if you want. Other ways I would do anything else. If she is here then its math, and let's do math. (Ella, January 2023)

Second interview

37. Shanthi: What is your opinion about doing hands-on activities and learning in different ways?
38. Ella: I feel like Norway is more developed. It's easier for me to learn in Norway than learning in home country. But in home country we are more string, nei, not string but like the teachers are like
39. Shanthi: Strict?
40. Ella: Ja strict. Ja, here they are like, if you don't understand, you can do it later. So, ja

Later in the interview

41. Shanthi: Do you have any suggestions for the teachers if they want to change or do things differently?
42. Ella: No, they are doing really great. I like that they are very patient.
43. Shanthi: When you say they do a good job how do you refer it? Is it referring back to your home country and here?
44. Ella: In home country they are also kind, but I think here [Norway] they are really extra kind here since they can just give them (incomprehensible). Since they [home country] can send them directly to principal that's why they are so strict (Ella, November 2023)

In line 34, Ella described seeing a teacher as more authoritative in her home country but not experiencing this authoritative nature in Norway. She gradually understood that Norwegian classrooms were more student-friendly, when she said, "here [Norway] they are like, if you don't understand, you can do it later" (line 40), indicating that students have the opportunity to decide when to do mathematics. Ella is positioning teachers in Norway as "very patient" (line 42) and "extra kind" (line 44), which is different from the view she had about her teachers in her home country, "strict". We assume that the strictness Ella refers to is more related to class discipline than mathematics teaching: since they [teachers in the home country] can send them [students] directly to the principal that's why they are so strict (line 44).

Olav also positions teachers in Norway as more helpful:

45. Shanthi: Jeg har kun vært i klasserommet ditt her i Norge noen få ganger, kan du fortelle meg litt om hvordan det er å være i mattetimen din? (I have been to your mathematics class in Norway a very few times, could you tell me about how it is to be in your math lessons?)
46. Olav: Bra. Lærer D er god lærer. Hvis noen trenger hjelp hun kan hjelpe. Hvis noen i klassen forstår ikke vi kan stoppe og fortelle fordi, hvis i hjemlandet, nei. Hvis du forstår ikke noen lærere kan ikke stoppe og continue. (Good. Teacher D is a good teacher. If someone needs help, she helps. If someone does not understand in the class we can stop and tell because if it is your home country, No. If you don't understand some teachers don't stop, they continue. (Olav, January 2024)

Olav names his teacher a "good teacher", then explains this by stating, "If someone needs help, she helps". Further, Olav also positions teachers in Norway as more approachable when he says, "if someone does not understand in the class we can stop" (line 46), indicating that Olav can stop the teachers and ask for clarification, something he did not experience in his home country.

We also have examples of some newcomers positioning their mathematics teachers as less demanding than teachers in their home country, as we see in Sandy's case:

47. Shanthi: Can you describe a good math teacher?
48. Sandy: My teacher in home country school so cool but she is sometimes angry. Because in my country teachers are angry, that's ok. I like she because she really teach. She writes examples, yes, ja. (shows through her body language that the teacher explains and students understand by nodding her head)
49. Shanthi: Are all the teachers in your home country strict and angry?
50. Sandy: Yes, in home country, and this [Norwegian] teacher is kind. If you don't understand oppgave (exercise) the teacher, say it's okay I give you another oppgave. In home country, you need to do this, you need! (taps on the table, showing how the home country teachers do). It's so funny sometimes. (Sandy, March 2023)

When asked to describe a good mathematics teacher, we see Sandy mentioning how the teacher in her home country was cool and sometimes angry (line 48), but Sandy

liked her. Sandy uses body language to express how her teacher explains tasks and how her students understand her teaching. In line 50, we also see her usage of non-verbal communication, such as tapping on the table and using other gestures to express the behavior she experienced on the part of her teachers in the two countries. Yet, in line 50, we also see her emphasize how teachers in her home country demanded that she do the work (you need to do this, you need to do the problem) and how the Norwegian teacher responds to her (if you don't understand oppgave (exercise), (. . .) it's okay I give you another oppgave). Norwegian teachers being extra kind might be a new experience for newcomers. Therefore, some newcomers seem to miss this authoritative nature of teachers in the introductory class, especially when those teachers challenged them to take on difficult problems.

In all three examples, we see how newcomers expressed their positive views about teachers. Ella stated that her Norwegian teachers are extra kind, Olav emphasized how teachers are more approachable, and Sandy saw teachers as less authoritative than teachers in her home country. This supports our storyline of "newcomers finding mathematics teachers extra kind and finding that they extend their help to them more than usual" when needed in the mathematics class.

#### 4.4. Newcomers Seek Alternative Resources for Learning Advanced Mathematics

Most of the students mentioned that they use translating tools in their learning. Students positioned different multimodal tools, such as books, online applications such as Google Translate, Campus increment, and YouTube math videos, as being useful for learning more advanced mathematics than they were receiving in the introductory classes. In the following exchange between Shanthi and Soya, for example, we can find evidence of this claim:

51. Shanthi: You follow both home country mathematics and here [introductory classes]. Why do you do that or both?
52. Soya: Because I don't think that now it is real math. It's so simple, it's only language. So, I don't think I do real math here and I like math, and I decided to study from my home country also
53. Shanthi: If you did not have home country teachers to support you, and you had to learn this math, and you said you like math, what would you have done?
54. Soya: Something from the internet that's interesting, so yeah. (Soya, January 2023)

Soya thinks mathematics learning in the introductory class is simple; as she says, "I don't think that now it is real math. It's so simple, it's only language" (line 52). We assume that for Soya, real mathematics is working on more challenging problems, as she did in her home country. She considers learning mathematics in the introductory class to be just for the sake of language learning, which also supports our first storyline. On further questioning (line 53) about what alternative she would have found if she did not have homework from her home country, she stated, "something from the internet" (line 54), indicating she would seek other alternative learning materials to learn more complex mathematics to fulfill her learning desire. Thus, she positions herself as a resourceful and eager mathematics learner.

Similarly, Kisan also positions himself as an enthusiastic self-learner who uses tools such as YouTube to learn more mathematics than offered in the introductory course:

55. Shanthi: Gjør du mer i hjemme enn de underviser her eller i klassen? (Do you do more [mathematics] at home than they teach here in the class?)
56. Kisan: Jeg lærer i hjemme. (I learn at home) Today I learn this page, and tomorrow we study the another page. So, when I study another page so that when I come to class tomorrow I know that, vet mer (know more)



57. Shanthi: Do you use any other things related to mathematics at home? For e.g., puzzles, from newspaper, Facebook, etc.
58. Kisan: Yes, ways of multiplication. For example,  $a^2$  var a ganget a (a multiplied a), I was not knowing. I see in YouTube, and I learn it. And the parentheses. I go to YouTube and I learn. Like I search upon something and if I do not get it then I go to sister. (Kisan, May 2022)

As we see in line 58, Kisan states, "For example,  $a^2$  var a ganget a (was a multiplied to a), I was not knowing. I see in YouTube, and I learn it". We assume that Kisan is keen to learn new topics and thus explores more new topics using digital tools. Though Kisan was not fluent in the language of instruction, he found ways to fulfill his learning desire through other available resources. Kisan used a mixture of both Norwegian and English throughout his interview, as we notice in lines 55 to 58.

Another alternative resource for learning mathematics newcomers talked about was mathematics books from their home country. For example, Emily describes how she used books to learn multiplication and division (line 60).

59. Shanthi: Prater dere om matematikk i hjemme? (Do you speak about mathematics at home?)
60. Emily: Noen ganger repeterer jeg alene også jeg har oppgaver fra hjemlandet i boka. Jeg leser den matematikken. Den har litt gange og deling (Sometimes I repeat alone, also I have exercises book from my home country. I read that mathematics, it has some multiplication and division). (Emily, April 2024)

We also see that the newcomers position themselves as resourceful students, as they find ways to fulfill their desire to learn more mathematics than the introductory course offers. We consider this to be a strength that students bring with them, and building on these strengths might support these newcomers to learn mathematics.

Soya's, Kisan's, and Emily's descriptions indicate that they wish to learn more mathematics. Hence, they position themselves as enthusiastic learners who find alternative learning tools to fulfill their learning desires. Therefore, the examples we presented here support the following storyline: newcomers seek alternative resources for learning advanced mathematics.

Taken together, these results suggest that there is an association between our storylines, and some of the examples we presented support many of these storylines and are interconnected to each other. Therefore, in the next section, we first discuss the storylines individually and then we step back to discuss our findings from a broader perspective.

## 5. Discussion

We asked what storylines occur in newcomers' interviews in which they talk about their experiences of learning mathematics in an introductory class and how they position themselves in relation to these storylines. We found that these four storylines revealed newcomers' experiences in the introductory class and how they positioned themselves and others, especially their mathematics teachers, in the learning process. These experiences included acts such as compromising mathematics learning, experiencing tensions as they engaged in language and math learning simultaneously, appreciating their teachers' kindness, and being resourceful as they found alternative tools to learn by themselves when language hindered their math learning. These storylines conveyed certain messages, such as how newcomers can find resources to fulfill their learning desires, which is a strength that needs to be further understood in future research. We discuss the storylines we identified and the related positionings in the following section.

### 5.1. The Storylines That Emerged from Newcomers' Perspectives and Related Positionings

#### 5.1.1. Compromising Opportunities Due to Overemphasizing Language Learning

The first storyline, “newcomers find mathematics easy because they are also learning a new language”, relates to how newcomers compromise their desire to learn higher-level mathematics for basic, simple, and easy mathematics. This storyline aligns with a phenomenon observed by Yoon (2012), who pointed out how overemphasizing language can be the sole obstacle to learning and reduce opportunities for students. She also described how this underestimates students' ability to learn different subjects. Similarly, in South Africa, Mahofa et al. (2017) reported that teachers of immigrant learners lowered the standard of the mathematical content as they were unaware of the immigrant students' prior mathematics knowledge and language proficiency. Thus, the overemphasis on language and the demand for becoming proficient in the host country's language positioned the teachers as language educators rather than focusing on teaching mathematics.

This storyline signals the political role of language in mathematics learning as it prioritizes learning the host country's language of instruction (Chronaki & Planas, 2018; Setati & Planas, 2012) over being able to do higher-level mathematics. As Civil (2012) highlights that, “language policy in many countries reflects the push for assimilation that often characterizes their policies towards immigration” (p. 133). This highlights the dominance of the language associated with power, hence, it has implication for the education of newcomers in the host country.

Notably, it also emphasizes the extra effort newcomers need to put to fulfill their learning desires. This agrees with the storyline Andersson et al. (2022) identified in their analysis of Norwegian news media: “students from minoritized groups put in extraordinary effort and time to learn mathematics” (p. 336). That is, newcomers put in extra effort to find resources to fulfill their learning desires also adds complexity to organizing the mathematics teaching to a very diverse class

#### Related Positioning

When we zoom out from individual positioning and see how newcomers position themselves as a whole group, we see that many newcomers position themselves as competent as they found mathematics learning to be simple, repetitive, basic, and easy. In her study, Esmonde (2009) refers to students' self-positioning as experts when “a student had to have positioned himself or herself as such and also had to have been positioned as an expert by peers” (p. 257) in group work. In our interviews, we considered the former, where they described themselves competent in the content. Yet, this expert position is not necessarily generalizable to the whole class, as many still liked learning basic and simple mathematics as it made them more confident in exhibiting their previous knowledge. We also saw how some students wished to have a language learner's position, demanding to learn the language before learning mathematics, thus indicating how different newcomers positioned themselves differently in the introductory class.

We see that it is not an easy task to find a common position that suits all students. Nevertheless, in relation to our first storyline, more than half of newcomers positioned themselves as competent and knowledgeable in mathematics. This positioning reveals how newcomers' wishes for learning complex or advanced mathematics were negotiated as they were expected to master the host country's language, thus positioning them as language learners. This position results from the policies and systems that follow those policies. It is also influenced by the more pervasive culturally shared storyline of assimilation (Civil, 2012; Phakeng & Moschkovich, 2013). Many newcomers accepted this position, while others demanded a shift, wishing to be recognized as experts in their mathematics knowledge, rather than just language learners learning basic mathematics.

### 5.1.2. Apprehensions of Navigating Between Different Systems and Their Influence on Newcomers' Psychological Health

The second storyline, "newcomers experience tensions when learning mathematics in a new language", highlights the potential emotional stress newcomers may go through when learning mathematics in a new educational system and in a new language. Barwell (2009) highlighted three tensions that are present in multilingual mathematics classrooms, namely, "between mathematics and language, between formal and informal language, and between students' home languages and the official language of schooling" (p. 6). These tensions are often observed in our mathematics class too. We believe that many of these tensions make newcomers apprehensive about learning mathematics. As Jhagroo (2015) emphasized, "students who do not speak or understand the dominant classroom language may feel a sense of isolation" (p. 109). Although the students did not focus on how these tensions made them anxious, newcomers may already feel apprehensive about being away from their home country and anxious about how they can rapidly learn the host country's language to integrate with its youth. These tensions may cause emotional stress for newcomers, as they are already in a transitional stage of their lives as adolescents.

Our second storyline may relate to the psychological adjustments newcomers go through as they navigate tensions. Psychological adjustments relate to "individuals' sense of subjective well-being or distress" (Makarova & Birman, 2016, p. 2). These may also include experiences of transitioning to a new system, which, as Jhagroo (2015) states, "maybe uncomplicated for some immigrant students, for others it can be a daunting experience, particularly if they are unfamiliar with the dominant classroom language" (p. 108). Navigating the tension of learning and adapting to a new educational system and its requirement to use a new language might be another psychological adjustment newcomers make. Also, recollecting previously learned mathematical concepts and connecting them to the present language of instruction is also related to cognition, a psychologically demanding task. Therefore, many newcomers may be emotionally stressed in this process of language learning and learning mathematics simultaneously.

#### Related Positioning

In the second storyline, newcomers positioned themselves as tense, confused, and stressed students as they had to navigate between different learning systems. This positioning is related to emotionality, which is an emerging area of exploration in positioning theory work (Kayi-Aydar, 2021). These young people juggle between adapting to their position as newcomers and the position of a normal teenager who wants to fit in with their peers. This juggling can result in developing psychological trauma as they are in one of the challenging phases of life, the adolescent phase (Makarova & Birman, 2016), and have recently undergone loss related to, for example, their home country. These positionings are not static and might change if they are provided with the necessary content and language support to succeed in their academic career. As highlighted by Chval et al. (2021), "students very quickly learn who is positioned in particular ways, and act on that language which how particular storylines come into being in classrooms" (p. 15).

### 5.1.3. Approachable Teachers and Their Authority

The third storyline, "newcomers find math teachers extra kind and find that they extend their help to them more than usual", emphasizes newcomers positioning their mathematics teachers as kind and approachable in the introductory class. In their study, Mendenhall et al. (2017) identified a similar response from refugee students who saw their instructors as helpful and supportive. Burner and Carlsen (2017) observed how teachers in the introductory classes had good intentions for their students and used their imagination

to solve problems and challenges posed in the introductory classes. This indicates that teachers do their best in a very diverse multilingual classroom. Since many newcomers indicated that their teachers in their home countries were strict and demanding, finding their mathematics teachers in Norway to be nice and kind is new for many newcomers. So, they experienced mathematics learning to be more relaxing and less stressful than what they experienced in their home countries. Therefore, many mentioned that they are motivated to learn in the Norwegian system. We think that this kind of approach displayed by teachers may support newcomers in developing a positive attitude towards learning mathematics.

Yet, newcomers positioning mathematics teachers as extra kind might signal the challenges newcomers face in differentiating between teachers' pedagogical approaches and understanding their own responsibilities as learners. We call it a challenge because teaching and learning in the multilingual classroom is usually accompanied by stress and anxiety, for both teachers and prospective teachers (Andersson et al., 2023) and newcomers. Teachers must understand newcomers' background knowledge and life experiences (Mendenhall et al., 2017), and newcomers must understand the new language, the system, and the teachers' pedagogical approaches.

#### Related Positioning

In the third storyline, newcomers positioned their teachers as extra kind, which indicates that they see their teachers as more approachable and less authoritative than those in their home countries. Many newcomers described being in a more comfortable and safer position in the introductory classroom. A similar positioning also was observed by Chinga-Ramirez (2017) and Mathisen (2020). This kind of positioning made them develop a positive attitude towards learning mathematics. Newcomers felt safe approaching their teachers for assistance and became more open to seeking support in learning. However, this positioning might raise the question of how newcomers interpret this kindness and whether they mistake it for not requiring them to be responsible for their learning.

#### 5.1.4. Seeking Resources Is a Strength

The fourth storyline, "newcomers seek alternative resources for learning advanced mathematics", highlights how enthusiastic newcomers are to learn mathematics and use different tools to fulfill their learning desire. The recent pandemic has equipped us with digital knowledge and many of the newcomers were already utilizing this knowledge to navigate between different languages when they moved between different countries and different educational systems. In addition, schools in Norway provide digital tools such as Chromebooks. So, accessing desirable learning resources is easier than ever. Nevertheless, our data provide evidence in the newcomers' stories of how they find alternative tools to fulfill their learning desire. We consider it a strength of newcomers that they know how to access different resources when they wish to learn more advanced mathematics. We also wonder about using these tools to scaffold students' language, rather than not allowing them to use tools like Google Translate.

Our fourth storyline and first storyline complement each other: newcomers desire to learn mathematics and the actions they take allow them to fulfill that desire. Thus, they position themselves as eager learners with the ambition of creating a better future. Khilji and Xenofontos (2024) found in their study that students from immigrant backgrounds saw the importance of mathematics in creating a successful future. We assume that securing a job in a foreign country is mostly dependent on a person's educational performance. For these newcomers, education becomes one of the main instruments for ensuring a good job, as most of them come either alone or with family who are also new

to a country, and obtaining a reference for a job is not that easy for them, as they may not have an educational background from Norway. Therefore, newcomers' futures are based on how they perform in their academics, which also includes mathematics.

#### Related Positioning

In the fourth storyline, we see many newcomers positioning themselves as keen, enthusiastic, and resourceful people, a strength they exhibited in fulfilling their learning desires. This positioning underlines the extra efforts newcomers put into being a newcomer and a language learner, which allows them to position themselves as hard-working (Andersson et al., 2022). Also, the storyline underlines the complexity of the teacher's positioning, as the teacher must find their own ways to plan a curriculum that supports the ability of every student in this group. We see that newcomers and teachers must both put in extra effort.

#### 5.2. Zooming out of Storylines—Complexities of Teaching and Learning Mathematics in the Introductory Class

When we zoom out of the four storylines and their relevant positionings, we see that some of these storylines are interconnected to each other, and hence some of the general findings from these storylines are also connected to each other. In the following section, we present three complexities that emerged from the storylines.

First, all the storylines underline the newcomers' position as language learners and the complexities they face when trying to learn high-quality mathematics in a new language in multilingual introductory classes. The storylines underline how some of the newcomers compromised their wishes to learn complex mathematics over basic mathematics. Others experienced tensions in navigating between languages and their learning systems. For many newcomers, learning mathematics is an important aspect for their future careers. This is also reflected in the storyline that Wagner (2019) mentioned, which states that "mathematics equips individuals". Thus, storylines bring forth what the newly arrived students have to negotiate when constructing their mathematical identity as mathematics learners (Khilji & Xenofontos, 2024). At the same time, we also observed how some newcomers mentioned that using different resources helped them to overcome their learning difficulties. If we take a strength-based approach (Collins & Fenton, 2021), the students exhibited their competency in navigating a challenging situation. Though newcomers had to put in some extra effort to fulfill their learning desires, they also showed themselves to be competent and resourceful learners (Chval et al., 2015). Thus, the storylines we identified are not static but will change if newcomers are positioned as competent and if their previous knowledge is acknowledged. In our data, we find that newcomers struggle to navigate between fulfilling their desire of building their own mathematical identity and learning a new language, dreaming of a better future, and psychologically adjusting to the complex newcomer position. We call this a complexity given that not all adolescent youth have the same experience.

Second, the storylines also underline mathematics teachers' positioning and the complexities of teaching mathematics to this diverse group of students. The storylines emphasized how newcomers positioned their mathematics teachers in Norway as kind, approachable, and non-authoritative. Yet, we also see that newcomers missed the opportunity to learn complex or advanced mathematics because of the diversity of the classroom. The storylines also highlighted how demanding the situation was for mathematics teachers, who had to adapt and enhance the curriculum to help language learners "to develop language and negotiate meanings through dialogic communication" (Chval et al., 2015) when newcomers had no common language for communication. Though teachers try to do their best in the given situation, it is challenging for them to fulfill every student's needs. They



need to meet the requirements of the educational system, which involves concurrently teaching both mathematics and the language of instruction (Phakeng & Moschkovich, 2013), thus positioning teachers as responsible for handling this complex situation. Burner and Carlsen (2017, 2022) highlighted a similar complexity in an introductory class with English teaching where teachers had a positive attitude towards multilingualism but struggled to practice it in the classroom because of students' diverse competencies in English and a lack of suitable teaching resources and a common language for communication among multilinguals. Without further support for teachers, in contexts that are extremely diverse, teachers will struggle to create a learning environment responsive to the broad range of language and experiences.

Finally, the storylines underline the underlying power of policies that position institutions to make decisions on how newcomers are organized when they arrive in Norway. There is a directive from the Norwegian Education Ministry to provide adaptive learning that caters to all students (Norwegian Ministry of Education, 2024b). Yet, there is no unique guidance for teachers on how to incorporate adaptive mathematics teaching to this diverse group. As indicated by Norozi (2019), there is not a definitive curriculum for the introductory class, and teachers are left alone to decide what to teach and how to plan the lessons. Mathematics teachers were not educated to be language teachers, so there are additional complications with doing both within this curriculum. Therefore, teachers have the responsibility to assess every newcomer's previous knowledge and set curriculum, pedagogical, and mathematical goals that accommodate every 13- to 15-year-old newcomer's mathematics learning desires. We know that the inclusive Norwegian school system considers all students to be equal (Chinga-Ramirez, 2017; Engen, 2010), which is a good thing, and learning the language of the host country is also important for rapid integration into society. Yet, we see in our identified storylines that the education offered in introductory classes is based on positioning newly arrived students as deviant from the mainstream organization, and it can form a barrier to newly arrived students' educational careers (Hilt, 2017). Hence, we think it is important that the policies, systems, and resources be reconsidered to keep up with the rapid diversity-related changes in society. Therefore, we expect future policymakers to pay attention to this complexity and find a way that supports both newcomers and teachers in developing adaptive learning in classes such as introductory classes that can provide both content development and language proficiency simultaneously.

## 6. Concluding Remarks

We identified four storylines and related positionings from newcomers' perspectives. Learning mathematics is a culturally shared, complex storyline which has its own social, cultural, and political dimensions that can position people differently in different social contexts (Gutiérrez, 2013). We believe that for many newcomers, learning mathematics is essential to their future success. Also, "language is about power, about who has the authority to designate the language of instruction and the "official" languages" (Gutstein, 2006, p. 244). Andersson et al. (2022) showed a storyline in their analysis of Norwegian news media that illustrates how this majority language and culture become the key for learning and knowing mathematics. Between these power dimensions, newcomers may struggle to find their position as mathematics learners and language learners. At the same time, they also need to develop their own language and culture. Each identified storyline underlined a message that newcomers wanted to convey, and the related positions they took on to do so. As we discovered these emerging storylines, we also uncovered some complexities teachers and learners must go through in the introductory classroom setting. These complexities invited us to discuss some of the implications for future studies.

### *Implications*

One of this study's implications is that policymakers and educators should listen to students' voices (Strikwerda-Brown et al., 2008), as they are essential in improving newcomers' learning experiences in the introductory mathematics class. Gutiérrez (2013) supports our claims as she highlights that "without the voices of marginalized people commenting on their interpretations of the mathematical practices in which they are engaged, we are unlikely to fully understand the possibilities of other arrangements in mathematics education" (p. 53). Also, allowing students to share their views on teaching and learning mathematics can aid them in developing an awareness of their own learning styles and preferences (Attard, 2011). Therefore, our identified storylines become resources, as they convey messages for mathematics educators and policymakers to identify a broader set of culturally shared stories of the teaching and learning of mathematics in classrooms such as introductory classes.

The second implication of this study is allowing newcomers to speak, which opens a space for them to learn their self-positionings, which arise in praxis. Herbel-Eisenmann et al. (2015) underline that "the storylines within which acts of positioning occur influence the ways in which others respond to acts of positioning" (p. 201). While sharing their stories, the participants could learn about the negotiations involved with learning the language and be aware of their own rights and duties as language and math learners. As highlighted by et Herbel-Eisenmann et al. (2024),

in mathematics education contexts we wish to see classroom participants recognize the power they have to negotiate positionings and thus feel free to contest the relational and power structures around them, to overcome the power of those structures by focusing on the immanent interlocutors, as positioning theory suggests this possibility. (p. 289)

In their interviews, many newcomers appreciated the opportunities they received to reflect on their experiences. Thus, our study emphasizes the importance of giving students opportunities to share their experiences, which helps newcomers acknowledge their strengths and helps educators and policymakers to learn from their messages about their wishes to learn mathematics. Especially if they are newcomers, this is the best way for both educators and students to consider the power dynamics they are navigating and the positionings that occur due to these power relationships.

The last implication of this study is creating awareness about the growing diversity of students in introductory mathematics classrooms and the complexities that exist in this setting (Barwell, 2016; Burner & Carlsen, 2017; Phakeng & Moschkovich, 2013). For teachers working in these very diverse mathematics classes, it is always a new challenge to meet various languages and fulfill their students' mathematical needs. For educators, it is important to be aware of this, as they may find these classes overwhelming. They will meet various languages and mathematics competencies in one single class. Chval et al. (2021) provide some strategies for teaching mathematics to multilingual students. Some of these strategies include facilitating multilingual learners' participation in mathematics (for example, by repeating, asking questions, writing notes on the board as they talk, validating students responses in front of everyone); facilitating partnerships between multilingual learners and their peers (for example, by monitoring how partners work, who speaks first, which student speaks for the group, who controls the materials that have been used for problem solving); engaging multilingual learners through culturally relevant contexts; using visuals and gestures in teaching mathematics; analyzing multilingual students' mathematical work and finding strategies that help multilinguals to distinguish between everyday language and specialized mathematical language (for example, by identifying students' familiarity with language, reading aloud, comparing and contrasting, and letting them use their first

language as anchor); and enhancing curriculum materials for multilingual learners (for example, by changing the sentences from the passive to the active voice, separating sentences when possible, replacing complex verb forms to present tense verbs, using a thematic approach, using multiple representations in the mathematics classroom, and recognizing different mathematical conventions). For multilingual students, understanding specific terminology in one language may not be the same as in another language, as previous research has shown (e.g., Barwell, 2016; Clarkson, 2006; Petersson & Norén, 2017). So, using students' cultural and lingual repertoires as a resource in learning is more important than considering them to be barriers. Barwell (2016) highlights this as “the other alternative language perspective” (p. 36), where other languages are also used as supportive languages in mathematics learning, along with the state's monolingual policy.

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