'LANGUAGE-AS-RESOURCE' IN MULTILINGUAL MATHEMATICS ACTIVITIES: AN EPISTEMOLOGICAL FRAMEWORK

ULRIKA RYAN, PETRA SVENSSON KÄLLBERG, LISA BJÖRKLUND BOISTRUP

It might be that [translanguaging pedagogy] gives results for them, the group with the same language, it may help. You saw the boy, he does not know Swedish, he has been in Sweden for four months. He was up at the whiteboard and talked [in Arabic] since he saw others talking in the same language. It is the first time he is up [at the whiteboard] and talks. [...] It [translanguaging pedagogy] takes a long time too, instead of doing three, four tasks or something in the lesson that lasts an hour, they should do at least 20 tasks.

A mathematics teacher, November 2018.

The teacher's quote comes from an interview made straight after a lesson conducted in Sweden where the teacher aimed at using 'translanguaging pedagogy'. Translanguaging pedagogy, according to García & Wei (2014), values all languages represented in the classroom equally. All languages in the classroom should be regarded as sources of mathematical knowledge and learning. This resonates with the idea that multilingual language use is a resource that enhances multilingual students' mathematics learning, a notion that is captured in the language-as-resource idea (Planas & Setati-Phakeng, 2014). In a translanguaging pedagogy classroom, a plurality of languages is spoken, heard, represented in students' written tasks, used on classroom displays, *etc*.

However, it is far from a straightforward matter for students and teachers to use all their languages freely when learning and teaching mathematics. Language policies and the politics of language value languages differently, enthroning hegemonic languages which usually coincide with the languages of instruction (Chronaki & Planas, 2018; Norén & Källberg, 2018). The teacher in the excerpt above, who participated in a translanguaging pedagogy intervention, commented on what happened when the students were encouraged to use their mother tongues in the mathematics classroom activities. The quote reminds us that it is not a straightforward matter to actualise the language-as-resource idea in multilingual mathematics classroom activities. On the one hand, the teacher seemed to think that language-asresource actualised as translanguaging pedagogy provides learning results and enhances student agency, since the pedagogy empowered the Arabic speaking boy to explain his mathematical ideas to the whole class. On the other hand, translanguaging pedagogy seemed to come into conflict with the teacher's comprehension of mathematics learning and knowing, where completing a specific number of tasks seemed to be what the teacher thinks mathematical knowledge (in the classroom) is about. The teacher appears to be in a dilemma.

This teacher's dilemma illuminates that there are epistemological dimensions of multilingual language use that concern how teachers and school cultures value and make use of multilingual (and) mathematical knowledge in classroom practices. The dilemma could be read as two conflicting epistemological values-mathematical knowledge as emerging dialogically or as a body of knowledge for the individual to consume. The latter reading of mathematical knowledge separates mathematical knowledge from multilingual knowledge and hence neither recognises nor fully grasps the complexity of language and epistemology in multilingual mathematics activities. In other words, the reading does not capture the relation between multilingual and mathematical knowledge and how knowing multiple languages and mathematics become actualised in multilingual school related mathematics activities, as connected to the idea of language as a resource. Relatedly, Geiger, Margolinas and Sträßer (2017) noted that there is a "special relationship between mathematics and language, be it written or spoken and that this has been underplayed in the discussion to date" (p. 18). In this article, invited by the teacher's dilemma, we endeavour to trace and grasp some different epistemological potentials in multilingual mathematics activities. By multilingual mathematics activities we mean all kinds of attitudes, experiences, and practical doings of mathematics that in some sense connect to multilingualism. Here we are not primarily interested in, for example, pedagogical designs of, communicative approaches to, or socio-political aspects of multilingual mathematics activities. Rather, we are concerned with the "special relationship" that Geiger et al. (2017) mentioned, specifically in terms of epistemological potentials in relation to multilingual school related mathematics activities. Our concern made us engage in an exploration of epistemological potentials in multilingual mathematics activities in order to develop a framework

that provides means to conceptualise those potentials. We conducted our exploration in three steps.

In the first step, Step A, we identify epistemological potentials of multilingual language use and mathematics in previous research concerning the language-as-resource idea. In Step B, we use empirical examples to explore how the language-as-resource potentials that we identified in Step A may be actualised in multilingual school related mathematics activities. In Step C, drawing on Steps A and B, we develop a framework for epistemological potentials of the language-as-resource idea with respect to multilingual language use and school mathematics.

We ask:

- a) What epistemological potentials for multilingual language use and mathematics can be identified in the language-as-resource idea?
- b) How are those language-as-resource potentials actualised in three different multilingual mathematics activities? and
- c) Based on findings of questions *a* and *b*, how may language-as-resource potentials be conceptualised in an epistemological framework for analysing multilingual mathematics activities?

Here, we adopt a broad understanding of (social) epistemology as a theory of knowledge that is concerned with how individuals and cultures come to acknowledge something as knowledge and the multiple forms in which knowledge appears (Derry, 2013).

Translanguaging as theoretical construct and as pedagogy

The notion of named (national) languages is tied to the inception of the modern idea of a nation-state and national identity (Creese & Blackledge, 2015). However, when taking the effects of migration and globalisation into account the notion of named languages offers a limited understanding of contemporary language practices and linguistic diversity. Translanguaging as a theoretical construct offers an alternative stance to named languages since it views languages as social resources without clear boundaries and recognises that people's complex linguistic and mathematical practices do not separate into different language systems (Planas, 2018). Rather, all words, grammatical structures, idioms etc. that are available to a speaker constitute the full range of the speaker's language resources. From this point of view, there is no such thing as first and second languages, merely languaging. Interlocutors use their language resources in continuous flows that they restrict only to their interlocutors' language resources. In other words, translanguaging is a dialogical re/production of language (Planas & Chronaki, 2021), in which language practises with different histories and cultures meet in interlocutors' interactions, as what García and Wei (2014, p. 21) call "one new whole". Translanguaging is not a linguistic hybridity but a new language practice which is dialogical and continuously in flux. Hence, multilingual language use is not a matter of separate named language systems, but of continua of dynamic synthesising of languages. While not necessarily explicit and therefore not apparent to the interlocutor(s), multilinguals' translanguaging is silently present in every instance of their communication, which means that translanguaging is always enacted (García & Wei, 2014). However, it is not only languages that flow through classroom talk; cultural-historical (epistemological) aspects of, for example, mathematics are also present in translanguaging flows (Farsani, 2016).

Translanguaging pedagogies draw on the theoretical construct mentioned above emphasising valuing multilingual students' fluid use of their full ranges of language resources in the classroom as a matter of agency, empowerment and justice. In practice this means that, for example, semiotic resources display several languages and mathematics, that students are encouraged to use all languages available to them despite that all languages might not be available to all their peers and the teacher. The teacher's quote in the introduction concerns a lesson in which he, for the first time, encouraged students to use a plurality of languages in the classroom, to open up translanguaging spaces where the full range of the students' language resources could be mobilised in mathematics activities.

To identify epistemological potentials of the language-as-resource idea

We consider language-as-resource as a widely spread idea that is shared among researchers, used in policymaking, and to various degrees accepted in society. The idea, which originates from a language planning programme in the US, suggests that minority languages could be utilised as a resource for instance in education. In multilingual mathematics activities a plurality of interrelated resources is at play, such as: named languages, *e.g.*, Arabic or Swedish; social languages, *e.g.*, school academic or colloquial languages; semiotic resources such as gestures, ambiguities, multiple meanings, information shown in graphs, codeswitching, and metaphors *etc.* We recognise, since knowledge appears in multiple forms, that all kinds of resources are present in and hold epistemological potentials for multilingual mathematics activities.

Although the language-as-resource idea is widely accepted, the acceptance may be ambiguous, as illuminated by Norén and Källberg (2018), who analysed official Swedish policy texts. In the texts they examined, newly arrived students' languages were claimed to be regarded as resources, while at the same time they were conceived of in deficit ways. For instance, newly arrived students were positioned as lacking the proficiency in the Swedish language that was required to succeed in mathematics in the Swedish school system.

An assumption we make is that widely shared ideas such as language-as-resource can take on different potentials. We think of potentials as possibilities embedded in an idea (Stivale, 2014). For example, embedded in the language-asresource idea is the (pedagogical) possibility that multilingual students receive subject specific supervision in their mother tongue. A potential transforms into a practice depending on how an actor *actualises* the potential in their own way (Stivale, 2014). The teacher in the introductory quote actualised language-as-resource potentials, for instance, by inviting the newly arrived boy to speak Arabic when he solved a task at the whiteboard. However, actors are not necessarily human. They can, for instance, be material resources, such as diagrams or rulers, or policy documents. Different actors' actualisations of potentials are connected to each other (Stivale, 2014). The teacher's actualisation of the language-as-resource idea is in connection with the Arabic speaking boy's actualisation of language-as-resource potentials because they act in relation to each other. The boy speaks Arabic in the classroom because of the teacher's actualisation, while at the same time the teacher actualises a translanguaging pedagogy-a language-as-resource potential—(partly) because the boy shares his task solution in Arabic. We use this logic: *idea—potential—actualisation* to identify epistemological potentials of the language-asresource idea (Step A) and to explore how the potentials are actualised in empirical material that concern multilingual mathematics activities (Step B). The framework that we propose in Step C is developed around the above logic of potentials.

Step A: Epistemological potentials of the language-as-resource idea

In Step A we identify epistemological potentials of multilingual language use and mathematics embedded in mathematics education research that connects to the language-as-resource idea. Ryan and Parra (2019) recently highlighted epistemological displacements within the language-as-resource idea. To distinguish the displacements, they note what they refer to as two waves (or trends): an initial wave and an emerging second wave of the language-as-resource idea. We build on Ryan and Parra's work as a starting point when identifying epistemological potentials that are distinct to each wave in the literature of the language-as-resource idea.

The first wave of language-as-resource and its potentials

In the first wave of language-as-resource (as described by Ryan & Parra) multilingual students' opportunities for communication and participation in mathematics is enhanced, for example, by switching between named languages such as Arabic and Swedish (Planas & Setati-Phakeng, 2014). In this wave, teacher dilemmas arise. One concerns whether the teachers should prioritise learning mathematics in the language of instruction, which is necessary for students to proceed to higher education, or whether they should encourage students to use informal (colloquial) mathematics talk in their first language as a way of scaffolding the learning of formal (school) mathematics (Adler, 2002). Prediger and Zindel (2017) note that communicative aspects of language use are highlighted, while epistemological aspects are usually downplayed. Related to this, Ryan and Parra (2019) showed that epistemological socio-cultural nuances of languages and mathematics inherent in multilingual students' language use are usually not considered in the literature of the first wave of language-as-resource.

To sum up: Epistemological potentials for *language use* that are embedded in the first wave of language-as-resource reside in named languages as separate language practices. The practice of switching between named languages is an example of this. An overall goal at school is proficiency in the language of instruction. Epistemological potentials for

mathematics in this wave reside in the students' reproduction of formal school mathematics that is free of socio-cultural nuances (see, *e.g.*, Chronaki & Planas, 2018). The epistemological potentials for mathematics are found in the separation between formal and informal mathematics. In the first wave of language-as-resource, multilingual students' first language can scaffold the move from informal mathematics talk in their first language to accessing formal school mathematics in the language of instruction.

The second wave of language-as-resource and its potentials

To understand multilingual mathematics education in the context of today's complex demography, the presently emerging second wave of language-as-resource displays theorisations of the idea of language-as-resource that attempt to move away from separations of named languages (the first displacement) (see, *e.g.*, Barwell, 2018; Planas, 2018) and, instead, consider students' production of mathematical knowledge as multifaceted cultural activities that comprise socio-cultural nuances (the second displacement) (see, *e.g.*, Chronaki & Planas, 2018).

The first displacement entails the resolution of distinct named languages, between which students (and teachers) may switch, through the introduction of the notion of translanguaging.

The second displacement entails recognition of pluralities in epistemological aspects of mathematics (as opposed to a focus on students' move from informal to formal school mathematics). Chronaki and Planas (2018) emphasised that a focus on students' production of mathematics as cultural activities is necessary to recognise the connections between mathematical epistemologies and cultural aspects of language use.

Ryan and Parra (2019) claimed that the above is a crucial contribution to the discussions on multilingualism in mathematics classrooms because, as shown by Knijnik (2012), multilingual students do not merely bring diverse languaging into the classrooms, but also mathematical knowledge systems embedded in their languaging. Hence, in multilingual mathematics classrooms, language is not merely a matter of communication but also of ways of knowing mathematics. As an example, Prediger et al. (2019) noted a difference between synthetic and analytic language rationalities in German and Turkish that seems to impact on students' conceptualisations. They showed how the meaning of ³/₃ moves synthetically from the parts to the whole in German, while in Turkish it moves analytically from the whole to the parts. The analytical way of knowing fractions differs from the synthetic way because it emphasises the whole, while the synthetical way emphasises the parts. As the German-Turkish speaking students in the study engaged with these nuances embedded in their multilingual use of (the) fraction concept(s), they experienced multi-perspective views on the part-whole concept. This example illustrates two different nuances in ways of knowing fractions. Another example of mathematical knowledge systems embedded in language is demonstrated by Knijnik (2012), who showed that when landless farmers in Brazil measured the area of land, they used mathematical knowing that was epistemologically grounded partly in local language and cultural practices and partly in school mathematics. Thus, multilingual students may need to handle culturally related epistemological aspects of language use and mathematics on both micro and macro levels, sometimes at the expense of being considered less knowledgeable (Ryan, 2019).

To sum up, epistemological potentials embedded in the second wave of the language-as-resource reside in multilingual language use in terms of translanguaging and mathematics as cultural activities. These epistemological language-as-resource potentials for multilingual mathematics activities embrace the production of 'one new whole' that comprise new ways of languaging and thereby new nuances of knowing mathematics. Thus, we conclude that the language-as-resource potentials reside in knowing mathematics as an activity of synthesising a plurality of mathematics. School mathematics, as taught in the language of instruction, is one mathematics among a plurality of mathematics.

Step B: Actualised epistemological potentials of the language-as-resource idea

In Step B of this study we identify how actors actualise the epistemological potentials of the first and second waves of the language-as-resource idea (see above). To illuminate some actualisations of the potentials embedded in the language-as-resource idea, we use empirical material that has the role of supporting and illustrating our understanding of the epistemological potentials for multilingual mathematics activities.

To that end we chose a policy text and a transcript from an interview with the multilingual secondary mathematics teacher quoted in the introduction, and a transcript from an interview made in 2017 with a multilingual Grade 5 student. We consider the policy text, the teacher, and the student as actors that actualise potentials of the language-as-resource idea.

We based the selection of the policy text on the following criteria; it was issued by the Swedish National Agency for Education (Skolverket), hence it guides teaching in a Swedish context; it deals with the language-as-resource idea; and it addresses mathematics. We chose *Studiehan-dledning på modersmålet* [Supervision in the mother tongue] (Skolverket, 2015).

The interview transcripts were selected since they comprise epistemological aspects of language use and mathematics in multilingual mathematics activities. The mathematics teacher interviewed, whose mother tongue is Arabic, participated in a school development project on translanguaging pedagogy. The student was a fifth-grade second-generation immigrant who said that he speaks Persian and Swedish at home.

In Sweden, students whose language proficiency in Swedish is considered to impede them from meeting learning requirements have the right to subject specific supervision in their mother tongue. The selected policy text is a support material for principals, teachers, and mother tongue supervisors for organising and implementing subjectspecific student tutoring activities in the mother tongue. The policy clearly builds on the language-as-resource idea, promoting multilingualism for learning Swedish and subject specific contents: Multilingualism is in many ways a resource for both the individual and society. Therefore, it is important that teaching in the school affirms the students' multilingualism and that teachers in all subjects take responsibility for the students' language development. Multilingualism may involve anything from mastering two or more languages as well as a native to only being able to use their different languages in certain situations or for certain purposes. (Skolverket, 2015, p. 8, our translation)

Multilingualism is a resource for the individual and for society. However, the policy text suggests separation of named languages, which relates to the epistemological potentials of the first wave of language-as-resource. Multilingualism appears to be a resource for developing Swedish language skills, as explicitly expressed in the quote above. Ultimately, Swedish is the desirable and *the* language in which to know mathematics.

Another purpose for subject specific supervision in the mother tongue is to support students to develop subject content knowledge. In the selected policy text, there are fictional examples that illustrate different ways of organising supervision in the mother tongue. In this context we would like to recognise that the complexity of contemporary migration patterns has blurred individual language identities. Today individuals may identify several languages as their mother tongues (Barwell, 2016). In the selected policy text, there is no explanation as to why the examples concern school mathematics. However, we chose to examine this particular text because it suggests how to orchestrate multilingual mathematics activities in the context of subject specific supervision. Since there is a focus on teacher-led instructions and solving (textbook) tasks, a 'task-solving focused school mathematics' idea (Andersson & Wagner, 2018) emerges: "The supervisor was in the lessons to help understand teacher led instructions held in Swedish and as a support when Natakan [a fictive student] worked on tasks on his own" (Skolverket, 2015, p. 19). In the quote it is implied that mathematics is learnt through teacher led instructions and by individual task-solving and thereby supports reproduction of formal school mathematics. Thus, epistemological language-as-resource potentials actualised in mathematicsspecific supervision are expected to move students from knowing informal mathematics talk in their mother tongue to knowing formal (school) mathematics in the language of instruction, Swedish. Language-as-resource potentials for new ways of knowing mathematics, as suggested in the theorisation of translanguaging (García & Wei, 2014), are not visible in the policy text.

In the quote in the introduction, the teacher talks about his attempts with translanguaging as pedagogy, hence there are language-as-resource potentials that could be actualised as new language practices in the mathematics classroom. However, in the teacher's talk, epistemological potentials for mathematics appear to reside in traditional textbook tasksolving. "It [translanguaging pedagogy] takes a long time too, instead of doing three, four tasks or something in the lesson that lasts an hour, they should do at least 20 tasks". The teacher's strong focus on students solving textbook-like tasks indicates that textbook mathematics is at the heart of mathematics teaching. Andersson and Wagner (2018) found that textbook tasks offer one way of knowing mathematics and conclude that activities that account for epistemological plurality are rare. Thus, since only one way of knowing mathematics is present, other ways of knowing mathematics are likely to be absent. This shapes a dichotomy (present absent) that resides in a separation between different ways of knowing mathematics.

In the interview with the multilingual student, Aldrin, he shared that his mother, who he said liked mathematics, used to bring him additional mathematics tasks in Swedish that she printed from the internet.

Ulrika	Why do you think that is?
Aldrin	I don't know. So that I will learn more Swedish.
Ulrika	OK. Does she think that it is important for you to learn more Swedish?
Aldrin	I don't know. I think it is because the tests I take here at school are in Swedish. That is why.

Aldrin's mother and Aldrin himself appear to be aware that knowing mathematics in Swedish is the desired outcome. Therefore, Aldrin needs to practise Swedish while doing mathematics. Relatedly, Svensson, Meaney and Norén (2014) demonstrated how immigrant students positioned their parents as insufficient mathematics homework helpers because of their language backgrounds. Thus, by accepting that they had limited possibilities to learn mathematics because of their parents' deficiencies in Swedish language and background, the immigrant students in Svensson's *et al.* (2014) study had, just like Aldrin and his mother, accepted knowing mathematics in Swedish as the desired.

The language-as-resource potentials embedded in this activity relate to separate named languages. Above, we described separation between formal and informal mathematics and the recognition of mathematics, free of socio-cultural nuances, as language-as-resource potentials of the first wave of language-as-resource. From an epistemological perspective, we find this excerpt contradictory. On the one hand, if mathematics is free from socio-cultural nuances, doing mathematics would be the same thing in any language. Hence, Aldrin should be able to do mathematics at home in Persian and still succeed at mathematics tests in Swedish; it ought to be the same mathematics at play. On the other hand, it is possible that Aldrin's mother had noted that socio-cultural nuances are embedded in language use in mathematics and thus inferred that doing mathematics in Persian is different from doing mathematics in Swedish. Consequently, to succeed at school, Aldrin must do mathematics in Swedish, since it is Swedish mathematics that is tested. The issue of whether doing mathematics in different languages is the same thing or not has been much debated (see e.g., Maheux, 2017). We note that the issue appears to be involved in Aldrin's mother's concern for his mathematics learning.

Step C: A framework for epistemological language-as-resource potentials

To draw attention to different epistemological language-asresource potentials in multilingual mathematics activities, here in Step C we develop and propose a framework that provides a way to consider epistemological potentials of the language-as-resource idea in multilingual school mathematics activities. Drawing on the results of Step A, we build the model on two axes that display continua from separating to synthesising (see Figure 1). The x-axis displays a continuum of epistemological potentials of mathematics that move from separating ways of knowing mathematics to synthesising plural ways of knowing mathematics. The y-axis displays the continuum of epistemological potentials of multilingual language use that move from separating named languages to synthesising new language practices. Together the axes make up an interface which allows for grasping relations between epistemological potentials of multilingual language use and school mathematics, and hence enables locating the epistemological potentials of the language-as-resource idea in multilingual mathematics activities.

In the lower left corner of the model we find the identified epistemological potentials of language use and mathematics of the first wave of language-as-resource (Ryan & Parra, 2019). Since we concluded (in Step A) that these potentials, when actualised, can move students from informal mathematics talk in their first language to formal mathematics talk in Swedish, we find the potentials to function as a *lever*. We bring together these potentials in *the 'lever' potential*. In the upper right corner of the model we find epistemological potentials of language use and mathematics of the second wave of language-as-resource, also identified in Step A. As shown in Step A, these potentials constitute prerequisites to produce new ways of languaging and knowing mathematics. Thus, we use García and Wei's (2014) wording and refer to this potential as the *'one-new-whole' potential*.

The exploration of how language-as-resource potentials may be actualised in multilingual mathematics activities (Step B) made us aware of that the actualisations do not necessarily fully adhere to the lever or to the one new whole potential. For instance, in the mathematics teacher's talk about the translanguaging project we found indications of



Figure 1. Framework for epistemological potentials in multilingual mathematics activities based on the language-as-resource idea.

synthesising languages, while at the same time constituting school mathematics as separated from other ways of knowing mathematics. In Aldrin's talk we found what could be indications of awareness of mathematics as a cultural activity, silenced by the separation of formal and informal mathematics. This shows that actualisations of the languageas-resource idea, such as those in this study, move dynamically among the language-as-resource ideas' epistemological potentials for language use and mathematics.

We find that the model allows us to add an epistemological focus to discussions on multilingual mathematics activities, which provides a means of avoiding the separation of mathematics learning and language learning issues, as articulated, for instance, by the mathematics teacher quoted above. Further, we also find that it provides a means for critical questioning of epistemological language-asresource potentials in the multilingual mathematics activities and hence deals with Bagga-Gupta and Dahlberg's (2018) critique of translanguaging pedagogy as becoming "a discourse of 'good' language pedagogy for a particular pupil population" (p. 403).

We hope that the proposed framework will invite scholars to consider epistemological potentials of language use and mathematics when analysing and/or designing practicebased research that comprises multilingual mathematics activities from the perspective of the language-as-resource idea. In addition, the framework can be used when writing mathematics textbooks as means to ensure and recognise language and epistemological diversity to provide opportunities for students to actualise the 'one new whole' potential in multilingual mathematics activities. We realise that the language-as-resource idea holds other potentials, and we hope that future research will develop the proposed model to include additional potentials of this important idea.

Acknowledgements

We would like to thank our colleagues in the MEWS (Mathematics Education Writing Seminar) group at Malmö university for valuable comments on drafts for this text. We are grateful for support from the Research Programme LIT (https://litresearch.se/) at Malmö University.

References

- Adler, J.B. (2002) Teaching Mathematics in Multilingual Classrooms. Dordrecht: Kluwer.
- Andersson, A. & Wagner, D. (2018) Remythologizing mystery in mathematics: teaching for open landscapes versus concealment. *Education Sciences* 8(2), 41.
- Bagga-Gupta, S. & Dahlberg, G.M. (2018) Meaning-making or heterogeneity in the areas of language and identity? The case of translanguaging and nyanlända (newly-arrived) across time and space. *International Journal of Multilingualism* 15(4), 383-411.

- Barwell, R. (2016) Mathematics education, language and superdiversity. In Halai, A. & Clarkson, P. (Eds.) *Teaching and Learning Mathematics in Multilingual Classrooms: Issues for Policy, Practice and Teacher Education*, pp. 25–39. Rotterdam: Sense Publishers.
- Barwell, R. (2018) From language as a resource to sources of meaning in multilingual mathematics classrooms. *The Journal of Mathematical Behavior* 50, 155–168.
- Chronaki, A. & Planas, N. (2018) Language diversity in mathematics education research: a move from language as representation to politics of representation. ZDM 50(6), 1101–1111.
- Creese, A. & Blackledge, A. (2015) Translanguaging and identity in educational settings. *Annual Review of Applied Linguistics* 35, 20–35.
- Derry, J. (2013) Can inferentialism contribute to social epistemology? Journal of Philosophy of Education 47(2), 222–235.
- Farsani, D. (2016) Complementary functions of learning mathematics in complementary schools. In Halai, A. & Clarkson, P. (Eds.) *Teaching and learning mathematics in multilingual classrooms*, pp. 227–247. Rotterdam: Sense Publishers.
- García, O. & Wei, L. (2014) Translanguaging: Language, Bilingualism, and Education. Basingstoke: Palgrave Macmillan.
- Geiger, V., Margolinas, C. & Sträβer, R. (2017) On the challenges of multilinguisme in mathematics education research. For the Learning of Mathematics 37(2), 16-18.
- Knijnik, G. (2012) Differentially positioned language games: ethnomathematics from a philosophical perspective. *Educational Studies in Mathematics* 80(1-2), 87-100.
- Maheux, J.F. (2017) Défis and opportunities of la diversité (linguistic) in publication. For the Learning of Mathematics 37(1), 20–24.
- Norén, E. & Källberg, P.S. (2018) Fabrication of newly-arrived students as mathematical learners. *Nordic Studies in Mathematics Education* 23(3– 4), 15–37.
- Planas, N. (2018) Language as resource: a key notion for understanding the complexity of mathematics learning. *Educational Studies in Mathematics* 98(3), 215–229.
- Planas, N. & Chronaki, A. (2021) Multilingual mathematics learning from a dialogic-translanguaging perspective. In Planas, N., Morgan, C. & Schütte, M. (Eds.) *Classroom Research on Mathematics and Language*. New York: Routledge.
- Planas, N. & Setati-Phakeng, M. (2014) On the process of gaining language as a resource in mathematics education. ZDM 46(6), 883-893.
- Prediger, S., Kuzu, T., Schüler-Meyer, A. & Wagner, J. (2019) One mind, two languages-separate conceptualisations? A case study of students' bilingual modes for dealing with language-related conceptualisations of fractions. *Research in Mathematics Education* 21(2), 188–207.
- Prediger, S. & Zindel, C. (2017) School academic language demands for understanding functional relationships: a design research project on the role of language in reading and learning. *Eurasia Journal of Mathematics, Science and Technology Education* **13**(7b), 4157–4188.
- Ryan, U. (2019) Mathematical preciseness and epistemological sanctions. For the Learning of Mathematics 39(2), 25–29.
- Ryan, U. & Parra, A. (2019) Epistemological aspects of multilingualism in mathematics education: an inferentialist approach. *Research in Mathematics Education* 21(2), 152-167.
- Skolverket (2015) *Studiehandledning på modersmålet* [Supervision in the mother tongue]. Stockholm: Skolverket.

Stivale, C.J. (2014) Gilles Deleuze: Key Concepts. New York: Routledge.

Svensson, P., Meaney, T. & Norén, E. (2014) Immigrant students' perceptions of their possibilities to learn mathematics: the case of homework. *For the Learning of Mathematics* 34(3), 32–37.



A sketch by Benjamin, age 14.