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A newcomer's spontaneous translanguaging in lower-secondary physics education

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ABSTRACT

Research indicates that encouraging translanguaging can enhance learning in a range of contexts. However, there are few studies examining translanguaging for learning among newcomers in science education. This case study fills this research gap by examining in what ways a newcomer to the school uses translanguaging practices with his classmate to participate more fully in a linguistically diverse physics classroom, where neither the teacher nor a majority of the students share the same home language. The data comprises transcriptions of video and audio recordings and photographs from nine physics lessons (students aged 14–15 years). Translanguaging practices[1] were identified and analyzed from a sociocultural perspective. Benito, the newcomer, spontaneously used English, Swedish, Spanish and Portuguese and prior knowledge in creative ways in interactions with his classmate during pair work, something that was not possible in whole class instruction. Multilingual peer dialogue, multilingual private speech and the use of multilingual artifacts increased learning opportunities. Moreover, Benito and his classmate Edin engaged in exploratory talk and demonstrated metalinguistic awareness. This study indicates that teachers who actively facilitate the use of students' multiple linguistic resources for sensemaking can contribute to a more egalitarian education and increase opportunities for learning in linguistically diverse classrooms.

ARTICLE HISTORY

KEYWORDS

Newcomers in mainstream classrooms; translanguaging; peer dialogue; private speech; physics education

Introduction and context

Due to intensified international mobility, schools and classrooms around the world are increasingly linguistically diverse. This means that a greater proportion of students than previously have a home language[1] other than the majority language, that students and teachers may have different home languages, and that classes comprise students with varying levels of command in the language of instruction. In these linguistically diverse classrooms, there are also newcomers.

In the academic year 2020/21, 5% of students in Swedish schools were newcomers (The Swedish National Agency for Education, 2021). The Swedish Education Act (2010, p. 800) defines newcomers as students who have previously lived in another country, started school in Sweden after the usual age for starting school (age 7), have attended a Swedish school for less than four years and who have emergent knowledge of Swedish. Newcomers are either placed directly in a mainstream class, or spend time in an introductory program with a focus on learning Swedish and selected subjects. Direct placement in mainstream classrooms is

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[1]In this study the languages that students use in contexts beyond the classroom are called home languages. Here we draw on Eisenschlas and Schalley (2020) who argue that in reference to languages that "home" is "not the same as "house one lives in" (i.e. the physical space), and should be understood more broadly as referring to a "point of reference from which speakers navigate the world" (p. 34).

particularly challenging for students with limited school background and in secondary school, where the language and subject content are more specialized than in primary school. The challenges of learning and embodied feelings of isolation have been described as like sitting on embers by a lower-secondary student who had recently transitioned from an introductory class (Nilsson Folke, 2016).

School teachers in Sweden who lack education about and experience with teaching newcomers can find teaching in linguistically diverse classrooms both challenging and frustrating (Juvonen, 2015; Tajic & Bunar, 2020). This may partly explain why newcomers do not always receive the kind of education that enables them to reach the learning goals of school subjects (SOU, 2019, p. 40). In this study the use of students' multilingual repertoires is understood to offer opportunities for more egalitarian and just conditions for learning by allowing all students, including newcomers, to be producers of knowledge (cf. Kerfoot & Simon-Vandenbergen, 2015). Newcomers, however, are not a homogeneous group and cannot be treated as a collective. Differences in school background, home language, migration trajectories and level in Swedish impact on their experience of learning. Even the way that classroom activities are arranged can make a difference, which is, in part, what this article turns its attention to. In this article we investigate the way Benito, a newcomer to the school, uses his linguistic resources in whole class and pair discussions with his classmate Edin. We also examine if his interactions with Edin increases Benito's opportunities for understanding and expressing physics content in the mainstream year 8 classroom.

Conceptual framework

In this study we draw on sociocultural theories of learning and translanguaging to analyze and interpret the data. As such, we recognize the potential that multilingual interactions have for learning.

Sociocultural perspectives on dialogue and learning

Sociocultural perspectives on learning are underpinned by Vygotsky's (1978) theories about the mediated nature of the human mind. Humans rely on symbolic and physical tools to regulate their relationships with others and act on their worlds. The symbolic tools include language in all its forms, numbers, music and art while the physical tools include all kinds of artifacts that humans create and use to communicate and interact. Learning per se is a continuous process wherein individuals bridge what they already know with that which has not been previously experienced and cannot yet be understood or expressed. With interactional support from more capable others (teachers, parents, peers) individuals can participate in activities and solve tasks that are beyond their current level of competence (Mercer & Littleton, 2007). When the support, or scaffolding takes place in a peer dialogue, the term peer scaffolding can be used.

Mercer and Littleton (2007) use the term interthinking to describe the talk we use to think together and engage with each other's ideas. They call the quality talk that often leads to the acquisition of new knowledge exploratory talk, or dialogue "in which partners engage critically but constructively with each other's ideas" (p. 59). In this dialogue students use language to share knowledge, challenge ideas, evaluate evidence and consider options in an equitable way. Thinking and reasoning together thus creates increased opportunities for learning, or as in this article, increased opportunities to understand and express physics content and participate in the physics classroom's activities. Researchers in second language acquisition have also pointed to the importance of collaborative dialogue and interaction with physical artifacts for students' participation in the learning process and for learning both content and how to reproduce knowledge in a new language (Lantolf, 2000; Swain, 2000). In other words, when students work together to complete tasks, they can help each other understand both the content of the task and the language needed to complete the task and express their knowledge. It has been argued that collaborative dialogue,

wherein learners help each other express ideas and knowledge that could not be expressed on their own, contributes to language and content learning (Swain, 2000).

The words that children or learners say to themselves when working on a task also have significance for learning. In sociocultural theory such utterances are called inner (when non-vocalized) or private (when vocalized) speech. While social speech and interaction mediate an individual's relationship to the world, objects and others, private and/inner-speech mediates the learner's relationship to his or her own consciousness (Vygotsky, 1986). Private speech can also illustrate how the learner himself takes an active role of a scaffolder in relation to his learning. When the individual has internalized and automatized the performance the scaffolding is no longer needed (Mercer & Littleton, 2007).

In contrast to earlier traditional conceptualizations of languages as fixed and separate codes, sociocultural theory views language as an activity, "languaging," wherein speakers engage in "a process of making meaning and shaping knowledge and experience through language" (Swain, 2006, p. 97). Languaging in peer dialogue or private speech can be compared to talking something through, focusing attention, solving problems, creating affect and reformulating ideas into communicated utterances (Swain & Lapkin, 2013). All these aspects can promote content learning since language is used to mediate the development of ideas and the formation of concepts (ibid.).

Translanguaging

The concept of translanguaging has its roots in bilingual teaching methodology in Wales in the 1980s, where it was described as the planned and systematic use of two languages for learning and teaching in the same lesson (Lewis, Jones, & Baker, 2012). Baker (2011) discusses four general advantages that translanguaging may offer in educational contexts; 1) promote a deeper and fuller understanding of the subject matter, 2) help the development of the weaker language, 3) facilitate home-school links and co-operation, and 4) help the integration of fluent speakers with early learners. In recent times, translanguaging has been variously conceptualized as an ontological perspective on language use based on bilingual practices (e.g. Creese & Blackledge, 2011), critical linguistic theory (Otheguy, García, & Reid, 2015) and critical pedagogical theory that can transform education för multilingual students (e.g. García & Leiva, 2014; García, 2009) (see Poza, 2017, for literature review). Some critics have argued that the transformative power of translanguaging is limited, because students are ultimately assessed in monolingual academic texts (Jaspers, 2018). In this study we follow Cummins (2021) crosslinguistic version of translanguaging which acknowledges and legitimates the importance of adopting additive approaches to minoritized students' bilingualism, teaching academic register and teaching for transfer of concepts, skills and learning strategies across languages (Cummins, 2021). As such, we regard translanguaging as a multilingual sensemaking process which can lead to knowledge production in one or a range of languages.

Cenoz (2017) makes a distinction between pedagogical and spontaneous translanguaging wherein pedagogical translanguaging refers to specific teaching strategies and spontaneous translanguaging to the discursive practices initiated by multilingual students (Cenoz, 2017, p. 193). Analysis of spontaneous translanguaging among linguistically diverse, adolescent students trying to solve linguistic problems reveals that multilingual practices can provide opportunities for learning and the mediation of cognitively complex activities (Martin-Beltrán, 2014). Li (2011, p. 1222) moreover describes translanguaging as "going between different linguistic structures and systems and going beyond them." He proposes the notion of a translanguaging space, a space for the act of translanguaging and created through translanguaging. In the translanguaging space, a sense of connectedness, creativity and criticality are embraced, and the capacity of the multilingual individual as an active agent, creating and managing their social spaces, is emphasized. Our study explores how translanguaging emerges spontaneously and creatively in pair work where Benito and Edin use a variety of linguistic resources to communicate and make sense of the science tasks they are working on.

Translanguaging connects to the sociocultural concept of languaging, and can be conceived of as a *multilingual* "vehicle through which thinking is articulated and transformed into artifactual form" (Swain, 2000, p. 97). Combining sociocultural and translanguaging theories allows us to analyze how multilingual students use their multilingual repertoires to scaffold interaction and participation in activities that are beyond their current level of ability.

Translanguaging for learning in science education

Previous studies of translanguaging practices in science classrooms around the world have revealed that pedagogical translanguaging (organized by teachers) can increase multilingual students' engagement and learning opportunities in science classrooms. For example, Kiramba (2019) showed how a teacher in Kenya, where the official language of instruction was English, drew on his own and students' translanguaging repertoires in year 4 science education to support the students' content learning and literacy development in English. When only English was used in the classroom the students were silenced, but when the teacher clarified and allowed students to express content in their home language, students could participate more fully. Translanguaging thus enabled the students to understand the content, to link the content with their earlier experiences and to be producers of knowledge. Lin and Lo (2017) analyzed how students (aged 14–15) in Hong Kong, were encouraged to use both English and Cantonese in interactions with the teachers during biology to bridge their everyday language/knowledge with disciplinary language/knowledge. Charambo and Zano (2019) reported on students in a 10th grade Chemistry classroom in South Africa who were instructed to use both their home language and English during science lessons. Those students performed better on both the science test and the English academic test than a control group. Wu et al. (2018) showed how English language learners were encouraged to use their mother tongues, different from the language of instruction, in two secondary school science classrooms in New York and Singapore respectively. Analysis of observations revealed that students' home languages were mainly used for translation and understanding of scientific concepts. Pedagogical translanguaging can also be implemented by using multilingual tutors (Reath Warren, 2016). For example, Karlsson, Nygård Larsson, and Jakobsson (2019) showed how a multilingual tutor who spoke Arabic and Swedish, enabled newcomers to build on preexisting knowledge expressed in everyday Arabic, to learn and express scientific knowledge in Swedish.

Spontaneous translanguaging among multilingual students can increase learning opportunities as well. In a fifth grade bilingual program in the United States there were many examples of how the students translanguaged, which for example helped them make meaning of and use recently acquired science vocabulary in their discussions (Poza, 2018). Daniel, Ryu, Tuvilla, and Wright (2021) illustrated how five refugee teenagers in the United States, two of whom were newcomers, used different home languages to interact and learn from each other. The students explained tasks and scientific ideas with the help of everyday experiences and language, discussed concepts like "cause" and "effect" and made sure everyone in the group understood and could participate in the activities. In a linguistically diverse science class in Sweden, four students participated and explained their ideas through the use of both Swedish and Turkish during pair work; something that was not possible in the monolingual whole class (Ünsal, Jakobson, Molander, & Wickman, 2018). Students thus had varying opportunities for interaction and learning, depending on the structure of the lesson (pair-work or whole class) and the languages that students could use.

With regard to science learning and the co-construction of knowledge, the above research shows that translanguaging practices provide multilingual students with opportunities for understanding scientific content, not least science concepts, by linking the content with their earlier experiences, and helping them to become producers or co-constructors of knowledge. Our study goes one step further, by investigating the nature of the multilingual interactions and how these interactions can scaffold learning during pair work. There is very little research exploring how newcomers use their different linguistic resources for learning science (but see Daniel, Ryu, Tuvilla, & Wright, 2021;

Karlsson, Nygård Larsson, & Jakobsson, 2019) and even less examining how translanguaging during pair work helps newcomers learn from each other in science education. Moreover, it is most common in the above studies that students and teachers share the same linguistic resources. Studies in linguistically diverse science classrooms where neither students nor teachers have the same home language are rare (but see Daniel, Ryu, Tuvilla, & Wright, 2021; Ünsal, Jakobson, Molander, & Wickman, 2018).

This case study thus fills a research gap by investigating how a newcomer uses spontaneous translanguaging practices to increase his learning opportunities in dialogue with his classmate in a linguistically diverse science classroom, where neither the teacher nor a majority of the students share the same home language. We aim to examine if and in what ways spontaneous translanguaging in a linguistically diverse physics classroom promotes a newcomer's opportunities for learning. Analysis of Benito and Edin's interactions is guided by the following questions:

(1) How does Benito use his linguistic resources in the whole class compared with during pair work?
(2) What kinds of translanguaging practices do Benito and Edin use, and what opportunities do they offer for understanding and expressing physics content?

Materials and methods

This investigation of a newcomer's use of his linguistic resources in a year 8 physics classroom is a qualitative case study as it is a "study of the particularity and complexity of a single case, coming to understand its activity within important circumstances" (Stake, 1995, p xi). We analyzed classroom observations as we wanted to observe and analyze naturally occuring interactions (Walford, 2018). Data was collected within a larger research project, *Multilingual students' meaning-making in the school subjects biology and physics* [2], financed by the Swedish Research Council.

Participants and classroom context

The data analyzed in this study were collected in a linguistically diverse grade 8 physics classroom (students aged 14–15 years) during units in which sound and light were in focus. Nineteen students agreed to participate in the larger study and 16 of them were multilingual, using two or more languages at home. Four students were newcomers. The two students in focus in this study were given the pseudonyms of Benito and Edin. Benito reported that his strongest language was Spanish but that he also spoke Portuguese and English at home. Until he was 12 years old, he lived in Spain and was taught in Spanish. He then moved to the UK and attended an English school for 6 months, where his English improved. When Benito was 13 years old, he moved to Sweden, and at the time of the data collection he had attended a Swedish school for two years, meaning he was a newcomer (Swedish Education Act, 2010, p. 800). Edin was born in Sweden and had only attended Swedish schools. In addition to Swedish, he reported that he spoke Bosnian at home. Thus, both Benito and Edin had a strong school background and each spoke languages in addition to Swedish. In the audio-recordings of Benito's and Edin's interactions, Benito was heard using English, Swedish, Spanish and Portuguese, and Edin using English and Swedish. They spoke a lot of English with each other, which was neither Benito nor Edin's strongest language. Benito already had the experience of being taught in a language other than his strongest language (English, in the UK) before being taught in Swedish. Both students showed a clear interest in physics lessons in school, and performed well in tests[3]

[2]Reath Warren did not participate in the research project.
[3]Written tests following each unit were collected, and in an interview, the teacher indicated that Benito and Edin were high-achieving students..

The participating teacher had worked as a teacher for more than ten years and was qualified to teach physics in secondary school. His instruction was distinguished by the expectation that students would use "physics words" and the visual models illustrating aspects of sound and light presented in the lessons, to express the subject content. This was expressed when the teacher talked to the class about the objectives of the lessons, how different tasks would be accomplished, and as he walked around the classroom, checking if students used the physics words or the model of sound/light when they were talking to each other. His lessons were also distinguished by the many group and pair work activities that the students engaged in, which provided them with many opportunities to think, talk and solve problems together (Axelsson & Jakobson, 2020; Uddling, 2019). The teacher mentioned in an interview that it was through conversation that students' thoughts became visible and that they could help each other understand, explain and express the subject content (Uddling, 2019). Thus, the teacher's approach to teaching was connected to sociocultural theory implying an expectation that interaction would benefit students' participation and learning. The language of instruction was Swedish and the teacher did not use or encourage students to use other languages to discuss subject content in the classroom. Researchers did not collect information on which languages he spoke.

Data collection and material

Data collection lasted for seven weeks and consisted of video and audio recordings of 18 lessons, digital photographs and classroom texts (such as textbooks, students' written texts). The observer's role was transparent, as the researchers explained the research intentions before the data collection began. Since the researchers sometimes participated in the classroom, but always as researchers, the observation can be called reactive observation (Angrosino, 2012, s. 166).

The data analyzed in this article are transcriptions of audio and video recordings of nine lessons. Each lesson lasted on average for 1 h and 10 minutes; four focusing on a unit entitled "Sound" and five from another unit, "Light." We analyzed only nine out of the eighteen lessons because we only audio-recorded the two focus students' peer dialogue during those nine lessons. In addition to the audio recordings, we also used photos to illustrate salient examples. Due to background noise in the classroom and the focus students' quiet voices, it was sometimes difficult to hear exactly what they were saying in the recordings (noted in transcription as "inaudible").

The project adheres to the ethical principles outlined by the Swedish Research Council (2017), regarding the requirements for information, consent, anonymity, and the right to withdraw from the project.

Data analysis

To address the first research question, we identified all instances of interaction that Benito was involved with. Then we compared the amount of time he actively participated in interactions in the whole class context with his overall interaction during pair work, which also included some instances of talking with the teacher, i.e. when the teacher checked in during pairwork. We noted how often he spoke, his use of translanguaging and whether he was an active agent who initiated speech. This overall comparison helped us to see if the way in which classroom activities were structured (whole class as opposed to pair work) provided different opportunities for the creation of a translanguaging space (Li, 2011).

After repeated readings of the transcriptions it became clear that Edin and Benito regularly used a multilingual repertoire in their interactions. To address the second research question, we investigated the nature of the multilingual interactions and whether they increased opportunities for learning physics. This was done by first identifying instances where Benito indicated that he moved from not understanding or being able to express content in physics, to understanding and being able to express the content. Not understanding was identified by the use of expressions such

as "How do you say that?" or "I don't understand this." An example of a change that indicated that Benito understood and was able to express the content in accordance with the physics discourse, was after he had looked up a Spanish translation of the Swedish concept *ljuskälla* (light source). Benito first read the Spanish translation aloud *fuente de luz* and then said in English, "Now I know what a source of light is." This utterance also shows that he is conscious about his learning.

We noticed that these instances (see above) occurred not only through interaction with each other, i.e. in peer dialogue, but also when Benito used private speech or material artifacts. The second step of analysis therefore focused on classification of the multilingual interactions as multilingual peer dialogue or multilingual private speech and multilingual artifacts. Such practices have otherwise mostly been analyzed in monolingual learning contexts.

To further develop the analysis in relation to the second research question, we investigated, in a third step, the significance of the multilingual peer dialogue and multilingual private speech for scaffolding and exploratory talk (Mercer & Littleton, 2007). In this study, exploratory talk was identified when Benito and Edin used language to share knowledge, challenge ideas, evaluate evidence and consider options. Thus, increased opportunities for understanding and expressing physics content in the multilingual interactions were analyzed in relation to a) expressed changes in understanding and expression of content in accordance with the physics discourse, b) the use of peer dialogue, private speech and artifacts, and c) scaffolding and exploratory talk.

In our study reliability was strengthened by the fact that the data was analyzed individually at all stages of analysis and then by both researchers, comparatively. For example when comparing our units of analysis (i.e. the instances where Benito indicates that he moved from not understanding or being able to express content in physics, to understanding and being able to express the content in the analysis) some of our units did not match up. Therefore we agreed to only analyze excerpts where we both clearly saw an expressed shift in understanding. Accordingly we removed some extracts where Benito expressed understanding but had not previously explicitly said that he lacked knowledge. Reliability was also strengthened through discussion and collaborative decision-making when identifying the three multilingual practices, (i.e. multilingual peer dialogue, multilingual private speech and multilingual artifacts) and in our analysis of scaffolding and exploratory talk. For example we decided to identify exploratory talk only when we both could see that Benito and Edin used language to share knowledge, challenge ideas, evaluate evidence and/or consider options.

Results

In this section, we first present how Benito's interactions during whole class activities compared with his interactions and use of translanguaging during pair work. We then present what kinds of translanguaging practices Benito and Edin used and what possibilities these offered for understanding and expressing physics content.

Translanguaging in pair work

The amount of time that Benito actively participated in interactions in the whole class differed from his active involvement during pair work. During the nine lessons, Benito participated orally in whole class interactions on seven occasions which, when added together, lasted a total of 3 minutes and 27 seconds. These interactions consisted of answering the teachers' questions correctly and briefly in Swedish. For example, when the teacher asked why there was a picture of boats and a glittering sea in the textbook, Benito answered in Swedish that the sea reflected light, which the teacher confirmed by repeating it. Despite his correct answers Benito sometimes used avoidance strategies, so he would not have to speak in front of the whole class, for example asking Edin to explain or keeping quiet until Edin had answered. Edin sometimes whispered the answer which Benito then said aloud in the class. On one occasion when the teacher had chosen a popsicle stick with Benito's name on it, Benito

whispered to Edin in Swedish "No, not the popsicle sticks! I don't have the energy to answer today." In the monolingual Swedish whole class Benito never once, throughout the nine analyzed lessons, independently took the initiative to speak out loud.

In the pair work activities Benito participated to a greater extent, i.e. for 291 minutes throughout the nine lessons. Sometimes, when the teacher checked in during pair work activities, Benito took the initiative and asked him the meaning of words (like *hörselskydd* "earmuffs," *ljusstråle* "beam of light"), and sometimes he shared his excitement about the experiments with the teacher (*Laser är fascinerande* "Laser is fascinating;" *Fascinerande. Jag vill lära mig mer om det.*"Fascinating. I want to learn more about it") in Swedish. Sometimes though, Benito was hesitant to speak with the teacher. For example, on one occasion Benito and Edin were eager to tell the teacher that they understood the

Extract 1 ~TC~

1	Benito	*Edin, förklara du.* Edin, you explain.
2	Edin	*Jag tror jag vet det du frågade oss tidigare. Pupillerna vad ska jag säga dom anpassar sig. Dom blir större och mindre. Dom blir upp mer i ljus* [speaking to the teacher] I think I know what you asked us before. The pupils, how can I put it, they adjust. They get bigger and smaller. They are up [sic] more in the light.
3	Benito	*I mörkret kan man säga.* In the dark, you could say.
4	Edin	*och gör så att vi kan se.* and that means we can see
5	Teacher	*Så om vi är här inne då? Är pupillen stor eller liten?* So if we are here, inside, what happens? Are the pupils big or little?
6	Edin	*Stor, eftersom det är mörkt. Dom anpassar sig. Om det är ljust då blir dom mindre.* Big, since it's dark. They adjust. If it's light then they get smaller
7	Teacher	*Ja varför blir dom mindre?* Yes, why do they get smaller?
8	Edin	*För att de behöver inte ha mycket ljus.* Because they don't need as much light.
9	Teacher	*Ok. Dom behöver inte lika mycket ljus. Aa okej.* OK. They don't need as much light, Ah, OK.
10	Benito	*Jag tänkte på det. Det var det jag försökte säga.* I thought of that. That was what I tried to say.

answer to a question posed earlier but when the teacher approached them4[4], Benito asked Edin to explain (line 1):

Extract 1 demonstrates how Benito, despite his initial hesitation, was able to participate in the activity by formulating an explanation in Swedish about what happens to light when it enters the eye together with Edin. In line 3, Benito even corrected Edin, saying that it is when it is dark, not light that the pupils get bigger, which Edins built on by saying "and that means we can see." Otherwise, it was Edin in extract 1 who explained what the students previously had come to understand in interaction with each other. Thus, the extract exemplifies how Benito gets interactional support from Edin, a more capable peer in Swedish. This helped Benito to increase his participation in activities and solve tasks that he could not have expressed on his own in Swedish (cf. Mercer & Littleton; Swain, 2000). In line 10, Benito mentioned that he had been trying to say what Edin just said, probably to let the teacher know that he knew more than he could express in Swedish alone. Extract 1 also exemplifies how Benito and Edin thought and reasoned together. Edin accepted and built on Benito's correction (line 3), saying that the pupils were big "since it's dark" (line 6). By sharing

[4]Transcription code: word = original words spoken (Swedish); word = original words spoken (languages other than Swedish); word = words translated from Swedish and other languages to English. In the running text, translations are given in single quotation marks.

knowledge and building on each others statements, their exploratory talk also created increased opportunities for learning (Mercer & Littleton, 2007).

When speaking with Edin during pair work, Benito often drew on his multilingual repertoire, for example, using words from, Spanish, Portuguese, English and French. Translanguaging repertoires were used in a flexible and creative way to talk, sing, joke and during private speech. In excerpt 2

Extract 2 ~TC~

11	Edin	*"Vilka olika stränginstrument känner du till"? Det kan jag. Gitarr Piano.* "Which different string instruments do you know?" [reading]. I know this. Guitar, Piano
12	Benito	***Piano***. ***Violin***. *Hur säger man det? Fiol?* Piano. Violin. How do you say that? *Fiol?* [Swedish word for violin]
13	Edin	***Violin***
14	Benito	***Cello*** (English pronunciation).
15	Edin	*Sen har vi …* Then we have…
16	Benito	***Cello. Cello. The big violin.***
17	Edin	*Ja, just det. Cello. Det har jag faktiskt spelat.* Yes, that's right. Cello. I have actually played that.
18	Benito	***Cello***. (in an Italian accent) ***Cello.***
19	Edin	***I know one*** [inaudible], ***it's a Yugoslavian one.***
20	Benito	*Vad heter det?* [inaudible]? ***What else? Spanish guitar. Ukulele! Ukulele ukulele*** What's it called? [inaudible] What else? Spanish guitar. Ukelele! Ukelele ukelele [singing]
21	Edin	[laughs]
22	Benito	***Ukulele*** [English pronunciation, said slowly, as if spelling it]
23	Edin	*Ukulele* [Swedish pronunciation]
24	Benito	***Ukulele ukulele*** [singing]. ***What about mmmm a small violin?***
25	Edin	***No it's like the same***.
26	Benito	"***Everybody***…." [sings]
		[4 lines in the transcription deleted, when they discuss something else]
27	Edin	***One more***.
28	Benito	***Okay. What about…Google?***
29	Edin	***Yeah Google*** [laughs]
30	Benito	***Por favor. Por favor. Google help us out here***. Please, please, [original words in Spanish] Google help us out here.
		[indecipherable 3 seconds]
31	Edin	***String instruments*** … *Äh … banjo!* String instruments. [writing and searching online] Oooh, banjo!
32	Benito	***Oh Banjo!*** *Bumbedibumbedibum* [sings]
33	Edin	*Banjo. Sen viola*. Banjo, then viola.
34	Benito	***The viola. That's what I meant by small violin, viola.***
35	Edin	***What's the difference between a violin and viola?***
36	Benito	***That one*** [probably pointing at an instrument on the Internet] ***has a lower sound than this one and a double bass. "Everybody catch up."*** [sings].
37	Edin	***We got guitar, piano, cello, fidja, violin, ukulele, banjo***, *harpa* ***and viola***. We got guitar, piano, cello, fidja, violin, ukulele, banjo, harp and viola.
38	Benito	***Yeah, now we've got string instruments.***

Benito and Edin were in the process of answering the teacher's written question about how many string instruments they knew, using their multilingualism to talk, sing and in private speech:

After reading the question in Swedish (line 11) Edin and Benito correctly identified several string instruments by themselves, using Swedish, English and stylized English (English with an exaggerated Italian accent). The identification of viola as a "small violin" (line 34) appears to be the only

misunderstanding. Words were repeated in different languages (lines 16, 17, 18, 22 and 23) and their translanguaging repertoire was also used to explain and specify different string instrument (lines 16, 19, 20, 36). For instance Benito mentioned that ukulele is a Spanish guitar (line 20). In their exploratory talk (Mercer & Littleton, 2007) they also built on earlier experiences. For example after Benito had explained that the cello was, "the big violin" (line 16), Edin said "Cello. I have actually played that" (line 17) then mentioned that he knew the name of a Yugoslavian string instrument (line 19).

In line 28, they turned to Google, typing "string instruments," in English, into the search field. Benito pleaded with Google in Spanish to help them (line 30). Edin then started reading the Google results aloud in English; "banjo" and "viola." After they had written down all the string instruments they had thought of, they read them all aloud in English (apart from the Swedish word *harpa* "harp" in line 37) then continued with the next task. Benito and Edin's use of English (when using Google) to support their science task in Swedish, is a good example of the leveraging of multiple linguistic resources for sensemaking or "to mediate cognitively complex activities (Martin-Beltrán, 2014). The spontaneous and creative use of their translanguaging repertoire in pair work was especially evident when singing (lines 20, 26, 32, 36).

The overall analysis shows that Benito and Edin used multilingual resources to construct a social, multilingual space during pair work. In this multilingual space, which is further explored below, Benito became an active agent who initiated interactions (cf. Li, 2011). In the multilingual space Benito had increased opportunities to position himself as a knowledgeable, multilingual student and to participate in the physics classroom's activities, and thus to learn.

The translanguaging practices and their opportunities for learning

Here we describe the translanguaging practices Benito and Edin used during pair work and their opportunities for learning. The findings are presented under two sub-headings; Multilingual peer dialogues and Multilingual private speech and multilingual artifacts.

Multilingual peer dialogues

In multilingual peer dialogue, Benito and Edin briefly scaffolded the meanings of words and engaged in exploratory talk. Brief scaffolding sometimes involved translation and other times, short explanation as described in many studies of translanguaging (cf. Reath Warren; Wu et al., 2018. In exploratory talk, the students thought and reasoned together, more specifically they used language to share knowledge, challenge ideas, evaluate evidence and consider options in an equitable way.

Brief scaffolding

Extract 3 ~TC~

39	Benito	***What's the word for source of sound? I always forget it.***
40	Edin	*Ljudkälla* Sound source
41	Benito	*Ok*

Benito and Edin engaged in multilingual peer dialogues about the tasks they were working on, and by doing so, they increased their opportunities for understanding and expressing physics content. Sometimes Benito only required a quick translation to complete a task, which Edin provided in extract 3.

Later during the same lesson, the teacher asked the whole class "What is sound?" and encouraged them to discuss their answers in pairs. Edin said to Benito *Ljud är vibrationer som skapas av…* "Sound is vibrations that are created by…," when Benito interrupted and completed the sentence with the Swedish words *en ljudkälla* "a sound source," indicating that Benito had understood how to express that concept in a scientifically adequate manner, in Swedish.

During the nine lessons there were many examples of how Benito and Edin learned to better understand and express scientific concepts through their multilingual peer dialogues where they briefly scaffolded each other. They often clarified the meaning of words or what something was called, and later some of these words were used appropriately in a scientific discourse (for example, *ljudkälla* "sound source"). Thus, their multilingual repertoire was used in peer dialogue to mediate the formation of concepts, an essential part in content learning (cf. Swain & Lapkin, 2013).

Exploratory talk

Benito and Edin engaged in exploratory talk (Mercer & Littleton, 2007) to share knowledge (extract 2, line 11 "I know this. Guitar, Piano."), challenge ideas (extract 1, line 3 "In the dark, you could say."), consider options (extract 2, line 24 "What about mmmm a small violin?"), and evaluate evidence (extract 2 line 35 "What's the difference between a violin and viola?") in an equitable way. Bento's and Edin's multilingual repertoire was used to think and reason together and thus created increased opportunities for learning (cf. Mercer & Littleton, 2007).

Several instances show how Benito and Edin learned to express subject knowledge through discussions with each other in English and Swedish. Sometimes these discussions laid the groundwork for a later more scientific discourse expressed in Swedish only. For example, whilst discussing what shadows were, Benito said: "*Månen har en skugga* "the moon has a shadow. Dark side of the moon." He then explained in English why the size of the shadow changed if you moved an object closer or farther away from the lamp, by saying "Cause it's covering more." A little bit later, when Edin and Benito together wrote an answer to the teacher's question *Hur skulle du förklara hur skuggor uppstår?* "How would you describe how shadows arise?," they helped each other to

Extract 4 ~TC~

42	Edin	*Hur skuggor uppstår.* How shadows arise.
43	Benito	*När skuggor vadå?* When shadows what?
44	Edin	*När ljuset.* When the light
45	Benito	*När ljuset vadå?* When the light what?
46	Edin	*täcks* is covered
47	Benito	*Skuggor. Vad säger jag? När ljuset täcks,* Shadows. What do I say? When the light is covered,
48	Edin	*så skapas skuggor.* shadows are created.

formulate the sentence: *När ljuset täcks så skapas skuggor* "When the light is covered shadows are created:"

With questions (line 43, 45), reformulations (line 44) and by building on each other's statements (line 47), Benito and Edin scaffold each other to express ideas and knowledge and to move toward a scientific discourse expressed in Swedish. The multilingual collaborative dialogues that preceded the production of physics knowledge in spoken and written Swedish were essential for Benito's content learning since language is used to mediate the development of ideas and the formation of concepts (cf. Swain & Lapkin, 2013). Thus, discussions in English acted as a resource for Benito, even when the final production was expressed only in Swedish. There were also instances when Benito and Edin, speaking Swedish, built on each other's speech and thus moved together toward a scientific discourse. Benito scaffolded Edin to improve his English and Edin scaffolded Benito to improve his Swedish. Thus, they were in many ways learning resources for each other.

In sum, during their exploratory talk in multilingual peer dialogues (Mercer & Littleton, 2007), Benito and Edin discussed and solved problems that they could not solve on their own. Furthermore, during these dialogues Benito and Edin took turns in supporting each other's language and knowledge development. In other words; Benito and Edin, through multilingual peer dialogues, scaffolded participation in activities that were beyond their ability (cf. Mercer & Littleton, 2007; Swain & Lapkin, 2013).

Multilingual private speech and multilingual artifacts

We also identified several examples of Benito "negotiating with himself" in abbreviated utterances which we categorized as multilingual private speech. These utterances often involved the expression of a need for a translation, or the actual use of an artifact (such as an online dictionary). When the artifact was used, the accompanying interaction was categorized as multilingual artifact. As the two categories overlapped significantly, they are presented together in this section.

The instances of multilingual private speech indicate that Benito, in order to solve a task in Swedish, sometimes thought aloud about it in a language other than Swedish. For example, in

Extract 5 ~TC~

49	Edin	*Händer det nåt mellan dina ögon och pappret? Vad händer? Händer det nåt emellan?* Does anything happen between your eyes and the paper? What happens? Does something happen in between?
50	Benito	***It's hard to explain. I have to translate a few words****. Nu måste jag tänka. Vänta. Översättning. Fan.* It's hard to explain. I have to translate a few words. Now I have to think. Wait. Translation. Damn.

extract 5, when he and Edin addressed a relatively complex question about light and sight, Benito explicitly invoked this need (line 50).

Benito first acknowledged the difficulty of the teachers' question, then expressed the need to translate; both of these thoughts were expressed in English. He then said in Swedish that he needed to think and by using the word *vänta* "wait" indicated that this might take some time. He then repeated the word *översättning* "translation" but in Swedish this time. His final word was a Swedish expletive, indexing frustration. Although Benito clearly found this question challenging, his private speech demonstrates how he took the active role of a scaffolder in relation to his own learning, namely, translating Swedish words, thinking and waiting, which helped him solve the task (cf. Vygotsky, 1986). When Benito said "It's hard to explain. I have to translate a few words. Now I have to think. Wait. Translation" (line 50) he demonstrated metalinguistic awareness, i.e. awareness that his different linguistic resources in different languages made different ways of reasoning and thinking available. He was also aware of that he first needed to understand the content in a language he knew better, before he could

explain the content in written Swedish. Excerpt 5 shows clearly how languaging (Swain, 2006) is a tool for thinking, to mediate the world (Vygotsky, 1978), and that multilingual students may need to articulate more complex thoughts and ideas in the languages they know best.

Extract 6 ~TC~

51	Edin	*Ljus bryts i ögonen så går dom går till signal … Vänta vänta det här är en sekundär. Om det inte är en sekundär är det en primär ljuskälla.* Light refracts in the eyes so they go to signal…Wait wait this is a secondary, If it's not not a secondary source of light it is a primary source of light.
52	Benito	*Primär ljuskälla är …* Primary source of light is…
53	Edin	*Det är solen solen … . Det här är en sekundär … Så.* It's the sun, the sun. This one here is a secondary … so (3 sekunders tystnad)
54	Benito	*För fan.* ***Fuente de luz*** Damn. Source of light [spanska]
55	Edin	*Å vad är det med de?* And what about them?
56	Benito	*Det är ljuskälla.* It's source of light.
57	Edin	*Aa* Yep
58	Benito	*Nu vet jag vad ljuskälla är för fan.* Now I know what source of light is, goddamn.
59	Edin	*Nehe Benito allvarligt … .* No way, Benito, are you serious?
60	Benito	*Jag skojade bara.* I was just kidding.
61	Edin	***It's a*** *sekundär ljuskälla* It's a secondary source of light.

Edin then continued, also engaging in private speech in Swedish, talking and thinking the question through (extract 6).

In Edin's private speech he considered the differences between primary and secondary sources of light. To participate in the activity and to answer the teachers' questions, Benito expressed that he needed to think and to translate "a few words" (extract 5, line 50). He translated *ljuskälla* "light source" into Spanish, and said in Swedish that he now knew what the expression "source of light" meant. Lastly, Edin said in a mixture of Swedish and English that [the paper] was a secondary source of light (referring to the teacher's question in extract 5, line 49). This implicitly explained what happens between your eyes and a piece of paper in front of you, i.e. that the paper reflects the light from the sun. While Edin's private speech was in Swedish, Benito used both English and Spanish to talk himself through the task, focus his attention and ultimately to solve the problem at hand (cf. Swain & Lapkin, 2013).

Benito did not always understand the everyday words used to explain scientific phenomena or the subject specific words themselves, when they were written or spoken in Swedish. He sometimes used private multilingual speech to support his thinking when this happened. Just before the interaction in extract 7, the teacher had been explaining the concept of a light beam, and how a spotlight, through the use of a concave mirror, refracts separate rays of light into

a concentrated beam (*ljusstråle*). The teacher used the phrasal verb *samlar ihop* "gather together"

Extract 7 ~TC~

62	Benito	*Samlar ihop. Google google … Google översätter alltså. Den översätter så här. Vad är det på portugisiska för fan?…. Okej.* ***Beam of light****.* ***A*** *just det* ***beam*** *är ju flera saker. Fy fan jag tänkte ju inte på det.* Gather together. Google, Google, Google Translate, so. It translates like this [inaudible]. What is that in Portuguese dammit? … OK. Beam of light. Of course, a beam means several different things. Dammit, I didn't think of that.

to explain the process of convergence. Benito was unfamiliar both with this phrasal verb and the more scientific term, and thus turned to Google to help him understand saying:

In extract 7 Benito tried to find a translation for the Swedish phrase *ljusstråle* "beam of light" by using Google Translate, expressing first a desire to know what the term was in Portuguese, and then finding an English explanation for "beam of light" that satisfied him. His final sentence indicates that he knew the term, but had not been able to connect it to the concept in Swedish. Again, through multilingual private speech and this time with the help of a multilingual artifact, Benito scaffolded his own learning, reformulating the Swedish scientific term *ljusstråle* into English "beam of light" (cf. Swain & Lapkin, 2013).

Extract 8 ~TC~

63	Edin	*Search for vätskan i snäckan.* Look for fluid in the cochlea.
64	Benito	*Snäckan.* ***Like this?*** Cochlea. Like this?
65	Edin	***No*** *vätskan* *No, fluid.*
66	Benito	***Oh, that's the snail.***
67	Edin	*Vätskan* Fluid
68	Benito	*Vätskan. Fan.* ***Oops****. Balansorgan. Den är svår. Varför är det på svenska?* ***English****.* Fluid. Damn. [10 seconds silence] Oops [5 seconds silence]. Balance organs. It is difficult. [Benito sings in English]. Why is it in Swedish? English.
69	Edin	*Betydelse* Meaning *(inaudible)*
70	Benito	[humming and singing] ***Coche cochelean cochlea*** [mispronouncing] ***inner ear****/ … ./****the middle ear*** [inaudible] ***the membrane covering*** [inaudible] ***it is attached to the end of the sac****.* Edin [sic] *jag hittade den.* Edin, I found it.
71	Edin	***Aha***
72	Benito	***It's amazing****.*
73	Edin	***What does it say****?*
74	Benito	*På engelska. Jag måste översätta den.* ***Read in another language. Where is it?*** *Vill du läsa den på svenska?* In English. I have to translate it. Read in another language. Where is it? Do you want to read it in Swedish?
75	Edin	*Läsa den? Jag tänkte faktiskt.* Read it? I thought actually (3 minutes of irrelevant dialogue deleted]
76	Benito	*Det var länge sen jag läste det här. Det var länge sedan.* ***Portuguese here we go.*** It's been a long time since I read this. It was a long time. Portuguese here we go.
77	Edin	***How's it going bro?***
78	Benito	***Amazing*** (continues reading half-aloud in Portuguese for 30 seconds). ***Portuguese is like the*** (inaudible) ***language I have ever read in my life. Ok I give up.***

During one lesson Benito and Edin were expected to each write their own text to explain in detail how earmuffs protect hair cells in the cochlea. Benito needed to understand more about how the hearing organs function, and searched for information on the Internet.

In extract 8, Benito started to read a text in Swedish but expressed that it was difficult. He then said that he needed to find a text in English (line 68) and found a text that described the anatomy of the ear and read through it half-aloud. He told Edin that he had found the information he was looking for (line 70) and that it was amazing (line 72). He stated that he had to read the text in another language, and looked for the link to translate the page (in Wikipedia), asking himself or possibly the computer "Read in another language. Where is it?." Benito asked Edin in English if he would like to read the text in Swedish. After a little while Benito started to read about the hearing organs in Portuguese. Figure 1 shows Benito reading the Portuguese web text about the hearing organs.

Benito stated in Swedish that it had been a long time since he read in that language and before he starts reading, he said "Portuguese here we go" in English. After about 30 seconds of reading aloud he sighed and remarked on the Portuguese language (the superlative he uses in inaudible) before saying "Ok I give up." (line 78). Benito's repeated use of the word "Amazing" indicates that he found the task challenging but also of great interest. It was not until after he had found and skim read through digital texts in Swedish, English and Portuguese that he finished his text independently and handed it to the teacher. Figure 2 shows the text that was handed to the teacher:

In Benito's text it is obvious that he was able to explain how earmuffs could protect the hair cells in the cochlea. He used subject specific words like *dämpar* "damp," *ljudvågor* "sound waves," *hörselceller* "hair cells" and *snäckan* "cochlea." The multilingual private speech and use of multilingual artifacts in Extract 8 acted as tools for Benito as he actively scaffolded his own learning. When he had internalized the performance he was able to produce a text in Swedish, demonstrating that the scaffolding was no longer needed (cf. Mercer & Littleton, 2007).

During the nine lessons there were many examples of how Benito improved his opportunities for understanding and expressing the subject content through multilingual private speech and by using

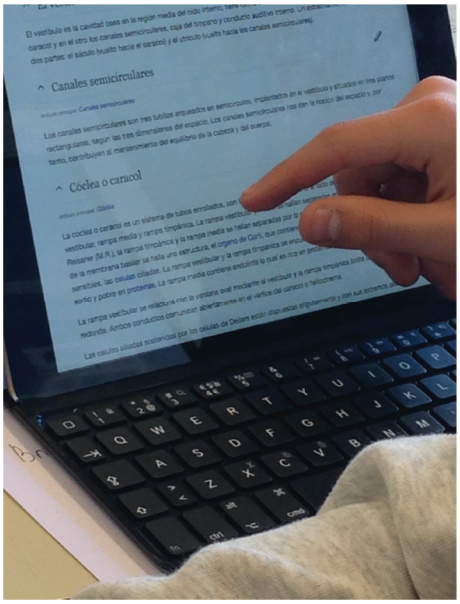

Figure 1. Benito reads [5]a webtext in Portuguese about the hearing organ.

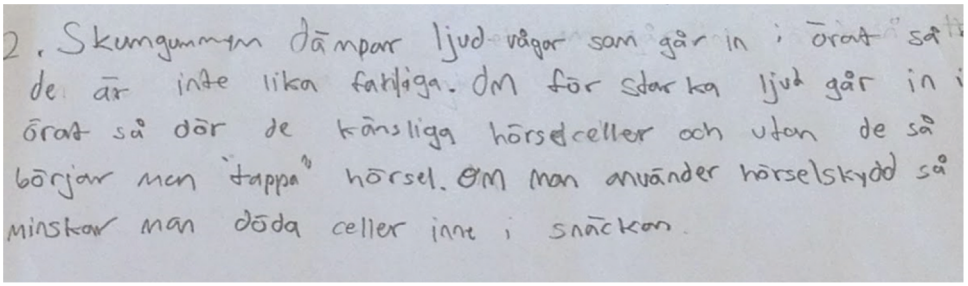

Figure 2. Benito's written text.

2. Foam rubber reduces sound waves that enter the ear so they are not as dangerous. If sound that is too loud enters the ear the sensitive hearing cells die and without them you can start to "lose" your hearing. If you use hearing protection the risk of killing the cells in the cochlea is reduced. (translation by Reath Warren)

multilingual artifacts. Benito's private speech, embedded in the peer dialogue, also shows, as mentioned before, how he actively scaffolded his own learning through language and metalinguistic awareness. In addition, private speech and multilingual artifacts were often used in relation to metacognition, as if to establish what he had to learn and how (extract 5 line 50, extract 8 line 74). He appealed to digital tools for help (Help me Apple; Ok man, seek; *Kom igen Youtube hjälp mig nu again* "Come on Youtube help me again"), and not least Google translate: Google. Help me out here; ***Por favor***. Google help us out here "Please Google help us out here"). He used multilingual artifacts to translate words from Swedish to English (such as *ljusstråle* "light beam") and to read factual texts in Spanish, Portuguese and English. Benito often demonstrated his metalinguistic awareness, for example expressing that he needed to read something in another language, to think and to discuss complex scientific concepts such as beam of light or source of light. This conscious use of different languages clearly shows how Benito used language as a tool for learning. Pair work discussions and activities made it possible for Benito and Edin to use their broad translanguaging repertoire, to link to previous knowledge and experiences and to develop both language and content knowledge (cf. Cummins, 2021; Swain, 2000).

Discussion

The overall analysis shows that Benito and Edin used multilingual resources spontaneously to construct a translanguaging space (Li, 2011) during pair work. This was not possible in whole class instruction as the teacher did not use or encourage students to use languages other than Swedish. In relation to earlier research (Charambo & Zano, 2019; Karlsson, Nygård Larsson, & Jakobsson, 2019; Kiramba, 2019; Lin & Lo, 2017) our case study makes an important contribution by revealing how a newcomer together with his classmate in a linguistically diverse physics classroom, harnessed the power of his multilingual repertoire to scaffold learning (cf. Swain & Lapkin, 2013; Vygotsky, 1978). The multilingual practises that offered Benito increased opportunities for participating and learning were multilingual peer dialogue, multilingual private speech (cf. Vygotsky, 1986) and the use of multilingual artifacts (cf. Vygotsky, 1978). In the multilingual peer dialogues there were several examples of interthinking and exploratory talk (Mercer & Littleton, 2007) where Benito and Edin engaged critically and constructively with each other's ideas. Moreover, in the peer dialogue Benito demonstrated metalinguistic awareness which also increased his learning opportunities. Benito's multilingual private speech and use of multilingual artifacts enabled him to work through tasks that were cognitively challenging and were often used in relation to metacognition, as if to establish what he had to learn and how. Altogether, while Benito clearly took an active role in

scaffolding his own learning, interactions in the translanguaging space primarily reveal how the two students took turns in scaffolding each other's language and content development.

During spontaneous translanguaging in pair work, Benito positioned himself as a knowledgeable, multilingual student and became an active agent who initiated interactions. Benito had well-developed strategies, not least concerning how to search for information on the web, which helped him to independently participate in different activities in the physics classroom. This represents a significant contrast to the newcomer in Nilsson Folke's (2016) study who felt out of place and uncomfortable in the mainstream, mainly monolingual classroom. This study thus reveals that spontaneous translanguaging can not only increase newcomers' opportunities for learning in mainstream classrooms but also, depending on how pair-work activities are arranged, contribute to their sense of belonging.

Regarding limitations, as the selected focus participants were friends and ambitious, resourceful students who enjoyed science they are not representative of all multilingual students. Moreover, Benito cannot represent all newcomers, who are a very heterogenous group. Other kinds of multilingual students may benefit from other kinds of translanguaging strategies.

Implications

The results have implications for future research, teacher education and teaching. Researchers need to learn more about how teachers can help newcomers create a translanguaging space, where students can harness the power of their multilingual repertoires to scaffold their own and each others' learning. This study demonstrates how a *resourseful* multilingual student used different languages in his repertoire to communicate and to learn. It would for example, be relevant to examine how teachers can support less resourceful newcomers in scaffolding each other in spaces for translanguaging.

For teacher educators, the results demonstrate that the translanguaging space can enable multilingual students to scaffold both their own and each other's learning and become creative producers of knowledge. Our results serve as a reminder that languaging (Swain, 2006) is a tool for thinking, to mediate the world (Vygotsky, 1978). This means that in linguistically diverse classrooms, multilingual students need to articulate more complex thoughts and ideas in languages they know best, alongside the language of instruction. Teacher educators can support student teachers by introducing them to theories and strategies for translanguaging for learning. This can moreover contribute to shifting traditional monolingual approaches to education.

There is also a number of takeaways for teachers in this study. Awareness of the benefits that spontaneous translanguaging in pairwork can have for newcomers when working with complex concepts can help teachers, not least secondary science teachers, better plan for pair work instruction in linguistically diverse classrooms. To facilitate the creation of translanguaging spaces among students it is however important that teachers carefully consider how the students are grouped (who works with who) so that their translanguaging repertoires can be used as resources for learning. Another implication for teaching is that translanguaging can result in monolingual, subject-specific texts (extract 4, Figure 2) that teachers can easily understand and assess (cf. Jaspers, 2018). Reliable multilingual artifacts such as multilingual dictionaries or multilingual tutors can potentially further enhance learning and the production of texts (see for example Karlsson, Nygård Larsson, & Jakobsson, 2019; Reath Warren, 2016). If teachers don't explicitly plan for translanguaging, there is a risk that students who have knowledge that they can only express in languages other than the language of instruction, especially newcomers less resourceful than Benito, will not be seen as producers of knowledge (cf. Kerfoot & Simon-Vandenbergen, 2015). On the other hand teachers that actively facilitate the use of students' multiple linguistic resources for sensemaking can contribute to a more egalitarian education and increase opportunities for learning in linguistically diverse classrooms.

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References

Angrosino, M. V. (2012). Observation-based research. In J. Arthur, M. Waring, R. Coe, & L. Hedges (Eds.), *Research methods and methodologies in education* (pp. 165–169). London: SAGE.

Axelsson, M., & Jakobson, B. (2020). Negotiating science - building thematic patterns of the scientific concept sound in a Swedish multilingual lower secondary classroom. *Language and Education*, *34*(4), 291–310. doi:10.1080/09500782.2020.1740730

Baker, C. (2011). *Foundations of bilingual education and bilingualism* (5th ed.). Bristol: Multilingual Matters.

Cenoz, J. (2017). Translanguaging in school contexts: International perspectives. *Journal of Language, Identity & Education, Identity & Education*, *16*(4), 193–198. doi:10.1080/15348458.2017.1327816

Charambo, E., & Zano, K. (2019). Effects of translanguaging as an intervention strategy in a South African chemistry classroom. *Bilingual Research Journal*, *42*(3), 291–307. doi:10.1080/15235882.2019.1631229

Creese, A., & Blackledge, A. (2011). Separate and flexible bilingualism in complementary schools: Multiple language practices in interrelationship. *Journal of Pragmatics*, *43*(5), 1196–1208. doi:10.1016/j.pragma.2010.10.006

Cummins, J. (2021). Translanguaging: A critical analysis of theoretical claims. In P. Juvonen & K. M (Eds.), *Pedagogical translanguaging: theoretical, methodological and empirical perspectives* (pp. 7–36). Bristol: Multilingual Matters.

Daniel, S. A., Ryu, M., Tuvilla, M. R. S., & Wright, C. E. (2021). The affordances of leveraging multilingual repertoires in scientific reasoning among resettled refugee teens: Functions of translanguaging in scientific reasoning. In A. Jakobsson, P. N. Larsson, & A. Karlsson (Eds.), *Translanguaging in science education*, Sociocultural Exploration of Science Education 27 pp. 99–118. Cham: Springer

Eisenchlas, S. A., & Schalley, A. C. (2020). Making sense of "home language" and related concepts. In S. A. Eisenchlas & A. C. Schalley (Eds.), *Handbook of home language maintenance and development: Social and affective factors* (pp. 17–37). Berlin: De Gruyter Mouton.

García, O. (2009). *Bilingual education in the 21st century*. Malden: Wiley-Blackwell.

García, O., & Leiva, C. (2014). Theorizing and enacting translanguaging for social justice. In A. Blackledge & A. Creese (Eds.), *Heteroglossia as practice and pedagogy* (pp. 199–216). Dordrecht: Springer.

Jaspers, J. (2018). The transformative limits of translanguaging. *Language & Communication*, *58*, 1–10. doi:10.1016/j.langcom.2017.12.001

Juvonen, P. (2015). Lärarröster om direktplacering av nyanlända elever. In N. Bunar (Ed.), *Nyanlända och lärande: mottagande och inkludering* (pp. 139–176). Stockholm: Natur & Kultur.

Karlsson, A., Nygård Larsson, P., & Jakobsson, A. (2019). The continuity of learning in a translanguaging science classroom. *Cultural Studies of Science Education*, *15*(1), 1–25. doi:10.1007/s11422-019-09933-y

Kerfoot, C., & Simon-Vandenbergen, A. -M. (2015). Language in epistemic access: Mobilising multilingualism and literacy development for more equitable education in South Africa. *Language and Education*, *29*(3), 177–185. doi:10.1080/09500782.2014.994522

Kiramba, L. K. (2019). Heteroglossic practices in a multilingual science classroom. *International Journal of Bilingual Education and Bilingualism*, *22*(4), 445–458. doi:10.1080/13670050.2016.1267695

Lantolf, J. P. (Ed.). (2000). *Sociocultural theory and second language learning*. Oxford: Oxford University Press.

Lewis, G., Jones, B., & Baker, C. (2012). Translanguaging: Origins and development from school to street and beyond. *Educational Research and Evaluation*, *18*(7), 641–654. doi:10.1080/13803611.2012.718488

Li, W. (2011). Moment analysis and translanguaging space: Discursive construction of identities by multilingual Chinese youth in Britain. *Journal of Pragmatics*, *43*(5), 1222–1235. doi:10.1016/j.pragma.2010.07.035

Lin, A. M. Y., & Lo, Y. (2017). Trans/Languaging and the triadic dialogue in content and language integrated learning (CLIL) classrooms. *Language and Education*, *31*(1), 26–45. doi:10.1080/09500782.2016.1230125

Martin-Beltrán, M. (2014). "What do you want to say?" How adolescents use translanguaging to expand learning opportunities. *International Multilingual Research Journal*, *8*(3), 208–230. doi:10.1080/19313152.2014.914372

Mercer, M., & Littleton, K. (2007). *Dialogue and the development of children's thinking*. London: Routledge.

Nilsson Folke, J. (2016). 'Sitting on embers': A phenomenological exploration of the embodied experiences of inclusion of newly arrived students in Sweden. *Gender and Education*, *28*(7), 823–838. doi:10.1080/09540253.2015.1093103

Otheguy, R., García, O., & Reid, W. (2015). Clarifying translanguaging and deconstructing named languages: A perspective from linguistics. *Applied Linguistics Review*, *6*(3), 281–307. doi:10.1515/applirev-2015-0014

Poza, L. E. (2017). Translanguaging: Definitions, implications, and further needs in burgeoning inquiry. *Berkeley Review of Education*, *6*(2), 101–128. doi:10.5070/B86110060

Poza, L. E. (2018). The language of ciencia: Translanguaging and learning in a bilingual science classroom. *International Journal of Bilingual Education and Bilingualism*, *21*(1), 1–19. doi:10.1080/13670050.2015.1125849

Reath Warren, A. (2016). Multilingual study guidance in the Swedish compulsory school and the development of multilingual literacies. *Nordand*, *11*(2), 115–142.

SOU. (2019). *Jämlikhet i Möjligheter och Utfall i den Svenska* Skolan [Equality in Opportunities and results in the Swedish school]. *Regeringskansliet*. Retrieved May 1, 2023, from https://www.regeringen.se/contentassets/23c13d7ae0ef48e4bed43b68917573d3/jamlikhet-i-mojligheter-och-utfall-i-den-svenska-skolan-sou-201940.pdf

Stake, R. E. (1995). *The art of case study research*. London: SAGE.

Swain, M. (2000). The output hypothesis and beyond: Mediating acquisition through collaborative dialogue. In J. P. Lantolf (Ed.), *Sociocultural theory and second language learning* (pp. 97–114). Oxford: Oxford University Press.

Swain, M. (2006). Languaging, agency and collaboration in advanced second language learning. In H. Byrnes (Ed.), *Advanced language learning: The contribution of Halliday and Vygotsky* (pp. 95–108). London: Continuum.

Swain, M., & Lapkin, S. (2013). A vygotskian sociocultural perspective on immersion education: The L1/L2 debate. *Journal of Immersion and Content-Based Language Education*, *1*(1), 101–129. doi:10.1075/jicb.1.1.05swa

The Swedish Education Act. (2010 800). https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/skollag-2010800_sfs-2010-800

The Swedish National Agency for Education. (2021). *Elever och skolenheter i grundskolan 2020/21[Students and school units in the compulsory school 1920/2021]*. Stockholm: The Swedish National Agency for Education. Retrieved May 1, 2023, from https://www.skolverket.se/download/18.68c99c081804c5929ea58cf/1655292646380/pdf9573.pdf

The Swedish Research Council. (2017). *Good Research Practice*. [Humanities and Social Sciences Research]. Stockholm: The Swedish Research Council. Retrieved May 1, 2023, from https://www.vr.se/english/analysis/reports/our-reports/2017-08-31-good-research-practice.html

Tajic, D., & Bunar, N. (2020). Do both 'get it right'? Inclusion of newly arrived migrant students in Swedish primary schools. *International Journal of Inclusive Education*, 1–15. doi:10.1080/13603116.2020.1841838

Uddling, J. (2019). *Textsamtalens möjligheter och begränsningar i språkligt heterogena fysikklass- rum [Opportunities and Limitations of Text-Talks in Linguistically Diverse Physics Classrooms]*. [Doctoral dissertation, Stockholm University] http://su.diva-portal.org/smash/record.jsf?pid=diva2%3A1344418&dswid=9409

Ünsal, Z., Jakobson, B., Molander, B., & Wickman, P. (2018). Language use in a multilingual class: A study of the relation between bilingual students' languages and their meaning-making in science. *Research in Science Education*, *48*(5), 1027–1048. doi:10.1007/s11165-016-9597-8

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, Mass.: Harvard University Press.

Vygotsky, L. (1986). *Thought and language*. Cambridge, MA: MIT Press.

Walford, G. (2018). Recognizable continuity: A defense of multiple methods. In D. Beach, C. Bagley, & D. S. S. Marques (Eds.), *The Wiley handbook of ethnography of education* (pp. 15–29). John Wiley & Sons, Incorporated. doi:10.1002/9781118933732.ch1

Wu, J. S., Mensah, F. M., & Tang, K. -S. (2018). The Content-Language Tension for English Language Learners in Two Secondary Science Classrooms. In K.-S. Tang & K. Danielsson (Eds.), *Global developments in literacy research for science education* (pp. 113–130). Springer International Publishing.