Reading & Writing - Journal of the Literacy Association of South Africa
ISSN: (Online) 2308-1422, (Print) 2079-8245

Supporting teacher dispositions towards translanguaging-for-learning in a Grade 9 mathematics classroom

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Dates:
Received: 29 Apr. 2024
Accepted: 14 Aug. 2024
Published: 19 Nov. 2024

How to cite this article:
Guzula, X. & Abdulatief, S., 2024, 'Supporting teacher dispositions towards translanguaging-for-learning in a Grade 9 mathematics classroom', *Reading & Writing* 15(1), a503. https://doi.org/10.4102/rw.v15i1.503

Background: Our article argues that the role of translingual instruction in mathematics classrooms is under-recognised in South Africa, as policymakers, teacher educators, teachers, learners, and parents assume that mathematics is just about numbers and calculations and not language. This is despite findings on the value of using children's familiar language resources in MacDonald (1991), code-switching for meaning-making in mathematics and science learning by Setati et al. (2002) and Probyn (2015), and the findings by Mbude (2019) on using isiXhosa for boosting mathematical and science skills.

Objectives: The main aim of our article is to examine the role of the Languaging-for-Learning (L4L) project in fostering 'supportive teacher dispositions' to translanguaging and bilingual and multilingual education. We will accomplish this aim through description and analysis of one Grade 8 and Grade 9 mathematics teacher and her learners who participated in the project.

Method: The study is a qualitative and interpretive linguistic ethnographic case study of a Grade 8 and Grade 9 mathematics teacher. The researchers used ethnographic methods to collect data and primarily draw on data transcribed from one of the video recordings of a lesson, fieldnotes of their classroom observations and still photographs from their classroom visits and L4L workshops. They used discourse analysis to interpret the data.

Results: The research findings point to the critical role that fostering supportive teacher dispositions to translanguaging can play in teacher development and in supporting learners' engagement and learning in multilingual mathematics classrooms.

Contribution: Our contribution to the field has been in demonstrating pluriversality in mathematics classrooms, showing how translanguaging enhances meaning-making and participation and helps to give voice to learners.

Conclusion: Having multilingual resources, collaboratively building knowledge and resources and team teaching with teachers played a role in supporting the teacher's development in pedagogical translanguaging.

Keywords: Kolonilingo-normativity; Anglonormativity; Pluriversality; Delinking; Language ideologies; Translanguaging.

Introduction

The role of multilingual instruction in mathematics classrooms is under-recognised in South Africa. This is despite substantial findings on the value of using children's familiar language resources for learning and meaning-making (Macdonald,1990), code-switching for meaning-making in mathematics and science learning by Setati, Adler, Reed and Bapoo (2002) and Probyn (2015), and by Mbude (2019) on using the children's most familiar language to boost mathematical and science skills. After having embarked on an 18-month linguistic ethnographic research and development project called the Languaging-4-Learning (L4L) project, we take a decolonial approach to languaging in the mathematics classroom and describe and analyse the translanguaging practices of a mathematics teacher and her learners. Translanguaging is, according to Garcia and Li Wei (2014):

> [*A*]n approach to the use of language, bilingualism and bilingual education that considers the language practices of bilinguals not as two autonomous language systems, … but as one linguistic repertoire with features that have been societally constructed as belonging to two languages. (p. 1)

Note: Special Collection - (Trans)languaging-for-learning in the South. The manuscript is a contribution to the themed collection titled '(Trans)languaging-for-learning in the South' under the expert guidance of guest editors Prof. Carolyn McKinney and Dr Xolisa Guzula.

We focus on the role of the L4L project in fostering what Poza (2019:408) calls 'supportive teacher dispositions' to translanguaging and bilingual and multilingual education and in creating what Guzula, McKinney & Tyler (2016) have called 'established translanguaging third spaces' as a means of making translanguaging the norm. Poza (2019:411) defines 'dispositions' as teacher 'beliefs and proclivity toward action'. The research findings point to the critical role that fostering supportive teacher dispositions to translanguaging can play in teacher development and in supporting learners' engagement and learning in multilingual mathematics classrooms.

Our research lens is that of teacher educators, looking to understand a mathematics teacher's pedagogical translanguaging repertoire following her participation in a professional development programme, that aimed to foster supportive dispositions toward translanguaging.

Although many teachers, like Mrs L, in this study translanguage in their oral discourse in the classroom, they are discouraged by education officials through circulars that discourage 'code-switching' (e.g. WCED Circular, 2017). We argue that discouraging use of translingual practices is steeped in colonial language ideologies and it is the reason for misrecognition of the role of multilingualism in meaning-making in mathematics classrooms. We start by theorising the colonial language ideologies that have contributed to the meaning-making challenges faced by African language-speaking teachers and learners forced to teach and learn mathematics in English only. Then we follow with the description of the methodology of linguistic ethnography which we use together with discourse analysis to analyse the teacher's and learners' languaging practices in a mathematics lesson on the factorisation of trinomials. We also offer a brief description of the L4L project from which this study emanates. The article concludes with our reflections on how colonial language ideologies were countered and disrupted through fostering supportive teacher dispositions to translanguaging and bilingual and multilingual education.

Conceptual framework: From Kolonilingo-normativity, Anglonormativity and monolingualism to translanguaging reframing of mathematics instruction

In this section, we provide an overview of the theoretical concepts we draw on to frame this article. Taking a decolonial approach and drawing on scholars such as Quijano (2007), Maldonado-Torres (2007) and Mignolo (2007), we argue that colonial language ideologies are the reason for misrecognition of the role of multilingualism in meaning-making in mathematics classrooms. Maldonado-Torres (2007) drawing on Quijano's (2007) notion of coloniality and modernity stresses that, despite colonialism having ended, colonial thinking that privileges Western knowledge, languages, and culture persists in the minds both of the former colonisers and of the formally colonised. The result is the erasure of and marginalisation of the languages of the colonised. Our teacher education institutions' curriculum policy in the Department of Basic Education and publishing houses' complicity with colonialism can be described, using Maldonado-Torres's (2007) words as 'breathing coloniality all the time and everyday' as we continue to read the world through the languages and the eyes of the coloniser. To demonstrate continuing coloniality, Guzula and Tyler (in press) have coined the term Kolonilingo-normativity (derived from 'colony' in isiXhosa and 'lingo') to describe the normalised expectation that indigenous people must be proficient in colonial languages in the former colonies in the global south. They localised 'colony' to '*koloni*' which is a conventional Xhosalisation of the English word used in South Africa to refer to the names of provinces such as 'iNtshona-Koloni' [the Western Cape] and used the informal term '*lingo*' to refer to language. In South Africa, Kolonilingo-normativity manifests in what McKinney (2017:80) terms Anglonormativity to illustrate how English in British colonies has been normalised in society in general and in education.

Historically, South Africa's Language in Education Policy (LiEP) endorses additive bilingualism and multilingualism. However, the absence of government support for the implementation of the LiEP of 1997 which promotes multilingualism, and the changing of this policy through the back door in the Curriculum and Assessment Policy Statement (CAPS) that prescribes English as the language of learning, teaching, and assessment (LoLTA) (McKinney 2017), has resulted in the exclusive official use of English in education. Anglonormativity and monolingualism in English thus persist in school language policies which inscribe the dominance of English monolingualism in education from Grade 4 onwards. Due to the dominance of these ideologies, there is a strong belief that African languages should be restricted to language subjects and not used as languages of instruction, particularly in mathematics and science education. Ndhlovu and Makalela (2021) have described this emphasis on English-only education as a monolingual orientation or bias, which is applied in the education of multilingual learners. It has also led to the continuing erasure of African languages in education post-apartheid due to the absence of assessment and educational resources for schooling in African languages beyond Grade 3, thus making the post-apartheid government more hostile towards African languages than the apartheid government was. Kerfoot and Bello-Nonjengele (2022) argue that monoglossic (and Anglonormative) language policies are a form of epistemic injustice.

Despite English being the default LoLTA from Grade 4, most South African learners have insufficient access to 'English language infrastructure' (i.e English speakers, materials and resources) to become proficient in English (Setati et al., 2002). This makes the continued pressure for and unsupported use of

English as the sole language of instruction problematic from a decolonial and social justice perspective. Local, national and international standardised assessments such as the ANAS, TIMMS and SAQMECS portray South African learners as performing poorly in mathematics (Mbude, 2019). The Group Areas Act of 1950 geographically segregated white people, Indian people, coloured people and Africans into separate residential areas, leaving a legacy of racially segregated schools. Disaggregated school-leaving learner results show that schools educating African language-speaking learners residing in Black-majority communities perform poorly. This amounts to epistemic injustice (Fricker, 2007; Kerfoot & Bello-Nonjengele, 2022) in the education of these learners as the teaching and testing regime ignores the fact that all subject content, including textbooks, are in English, and all assessments are written in English and not in the learners' home languages.

Translanguaging in the mathematics classroom

In earlier research in the field of languaging and translanguaging in mathematics classrooms in the South African context, Setati et al. (2002) argue for drawing on learners' languages as resources for learning. Setati et al. and Sapire and Essien (2021) point out that language was not always seen as a resource in multilingual settings in the 1970s. The notion of language as a resource was first introduced by Ruiz (1984) to challenge orientations to multilingualism that view language as a problem, which then positions multilingual learners with deficits. Setati et al. particularly argue that code-switching in multilingual classrooms must be harnessed as a resource for exploratory talk. Exploratory talk is a form of classroom talk that gives opportunities for learners to work on their understanding (Barnes, 1992).

According to Barnes (1992), exploratory talk is:

> '[*O*]ften hesitant and incomplete; it enables the speaker to try out ideas, to hear how they sound, to see what others make of them, to arrange ideas and information into different patterns.' (p. 126)

Learners translanguaging and using their languages for exploratory talk is important for disrupting presentational talk by teachers which often makes instruction more teacher centred. It gives voice to learners, allowing them to participate, engage, explore and to question. Translanguaging therefore gives voice to learners who are often silenced in classrooms where teachers insist on learners speaking English only.

In South Africa, two views on translanguaging in the mathematics classroom emerge: Small-scale research argues for viewing 'learners' home languages as a resource for learning', while large-scale research has shown that, in the context of mathematics learning, 'multilingualism' is commonly framed as part of the problem (Setati, Chitera & Essien, 2009:65; Sapire & Essien, 2021). Internationally, Marshall, McClain and McBride (2023:3) concur and argue that language has not always been seen as 'a solution for promoting productive disciplinary engagement'. However, South African teachers working in multilingual settings have been code-switching or translanguaging for a long time (Setati et al., 2002), thus enabling meaning-making, although they do not regard their translanguaging practices as legitimate (Probyn, 2009). The response from Anglonormative and monolingual systems of education has been to discourage code-switching or translanguaging in teaching and learning.

Research in mathematics learning shows that there is a substantial distance between any natural language and the language of mathematics, and that this distance is even greater between learners' second language and mathematics language (Gerber, et al., 2005 cited in Setati et al. 2009:74). Despite this, traditional response to multilingual learners struggling with low achievement is usually teachers simplifying their pedagogy and assessments, 'rather than expanding the language resources available to students for sensemaking' (Marshall et al., 2023:8). Added to this is the expectation that learners should be given access to the academic register of mathematics, or mathematics language (Setati et al., 2002; Tyler, 2016). Setati et al. (2002) describe the journey from everyday language to mathematics language as linear. However, Tyler (2016), drawing from Gibbons (2009) who argues for mixing of registers or register meshing, argues that in multilingual classrooms, the move from everyday language to an academic mathematics register is not linear but multidirectional. Therefore Tyler (2023) introduces the terms transregistering and register meshing to enable decolonial cracks in classroom discourse to emerge. This means that instead of creating binaries between everyday registers and scientific or academic registers, we should view these as working interdependently and multidirectionally to enhance meaning-making.

Mignolo's (2007:453) concept of delinking allows one to disengage from colonial language ideology to create space for 'non-western' epistemologies, principles of knowledge and understandings and include indigenous languages. Beyond delinking, Mignolo (2007:499) argues for pluriversality, explained 'as a universal project leading toward a world in which many worlds will co-exist'. Mignolo (2007) states further that a:

> … world in which many worlds could co-exist can only be made by the shared work and common goals of those who inhabit, dwell in one of the many worlds co-existing in one world and where differences are not cast in terms of values of plus and minus degree of humanity. (p. 499)

This coexistence can be seen linguistically, as many South African teachers translanguage between English and African home languages in oral discourse to bring about epistemic justice and epistemic access in mathematics classrooms (although not necessarily in written discourse) (Makalela, 2015b; Kerfoot & Bello-Nonjengele, 2023). This could be perceived as a futile exercise since assessments are taken in English only. However, oral translanguaging is better than total English immersion, as it contributes to meaning-making and enables learners to participate and engage in exploratory talk (Barnes, 1992) using their full linguistic repertoire.

When they use English only and do not translanguage, teachers become complicit with the enforcement of English, resulting in rote learning, safe talk (Chick, 2001) and silencing (McKinney, 2017), and in failing learners who are not able to understand school content taught and assessed in English. However, while conceptual and practical 'delinking' of mathematics instruction from English-only approaches is a step in the right direction, if the target is still 'mathematics language', there is still work to be done contending with the history of mathematics as a discipline. Rather than just mere coexistence and hybrid uses of languages through translanguaging and transregistering, Accurso and Mizell (2020) argue for 'remixing' as a way to engage students in reimagining different ways that 'the language of mathematics' can be understood in the future.

Linguistic resources, language repertoires and translanguaging

Research in multilingualism and multilingual education has long recognised the need for acknowledging and legitimising learners' and teachers' linguistic repertoires (Busch, 2012) and using their languages as resources for learning (McKinney, 2017). The use of flexible language repertoires can enable learners to learn languages without them being aware of it (McKinney, 2017). García, Ibarra Johnson and Seltzer (2016:50) prescribe the translanguaging stance as a foundation for drawing on multilingual teachers' and learners' linguistic repertoires and for implementing translanguaging pedagogies. They outline three principles of the translanguaging stance: (1) affirmation of the inherent worth of students' language practices and cultural understandings, (2) affirmation of the knowledge and cultural wealth of students' families and communities, and (3) the importance of the classroom as a democratic space where knowledge can be co-created. Embedded in these principles around inclusion and language rights is the need for teacher dispositions that support translanguaging practices and the use of language as a resource (Poza, 2019:411). Thus, the research and development work in the L4L project has been focused on delinking teachers' ideologies from a monolingual orientation and Anglonormativity, held in place by school policy, and on expanding their dispositions to be more pluriversal, including a multilingual orientation that allows them to engage in multilingual communication practices and pedagogic translanguaging.

Teachers' engagement in flexible repertoires and using translanguaging is not new. Probyn (2009) describes teachers reporting their 'smuggling' the vernacular into the classroom to indicate that translanguaging is transgressive of the English LoLTA requirement. Translanguaging is increasingly being seen by teachers and researchers as a legitimate practice which is strong enough to challenge the authorised policy and reconstitute teachers as policymakers at the chalk face and from below. In multilingual classrooms, heteroglossic or translanguaging practices include 'teacher and peer translation, bilingual recasting, alternation across features of named languages, [code-switching], strategic grouping of students, and praising metalinguistic speech' (Poza, 2019:411). Probyn argues that while the notion of translanguaging reflects acceptance of a heteroglossic or bilingual reality and a more comprehensive and flexible use of the classroom language resources to mediate learning, 'translation' refers to 'repetition by the teacher of lesson content or instructions in the learners home language' and it reflects a temporary (and sometimes illicit) deviation from a monolingual ideal (Probyn, 2015:220). She also claims that code-switching refers to a temporary move from one code to another and reverting to the dominant code.

While Probyn's (2015) study shows teachers creating adaptive third spaces that enable teachers to smuggle in the vernacular for meaning-making, Guzula, McKinney and Tyler (2016) have explored the concept of established third spaces that legitimise translanguaging as a pedagogic practice for teaching multilingual learners. The term 'third spaces' in 'translanguaging third spaces' is based on Soja's (1996:5 cited in Garcia & Li Wei, 2014) concept of third spaces which he defines as 'spaces "in between" and beyond two binaries, conceptualisations and discourses often thought of as separate and uncombinable'. The relevance of third spaces for this article is that it relates to the bridging of linguistic binaries between English and isiXhosa in mathematics classrooms. Flores and Garcia (2013) conceptualised language-related third spaces as linguistic third spaces, where multilingual speakers can draw on their hybrid repertoires. Garcia and Li Wei (2014:133) distinguish between adaptive third spaces and established third spaces claiming that adaptive third spaces are temporary spaces where teachers might allow learners to translanguage and then return to English communication practices. Established third spaces on the other hand refer to spaces that deliberately legitimise multilingual communication practices. Guzula et al. describe translanguaging third spaces as spaces that offer opportunities for transforming classrooms from using only monolingual, standardised, pure, named and countable languages to spaces allowing for flexible, dynamic, and fluid language practices of bilingual and multilingual learners.

Pedagogic translanguaging

To deal with criticism of translanguaging (see Jaspers & Madsen 2016) or spontaneous translanguaging, Cenoz and Gorter (2017) coined the term pedagogic translanguaging to show how translanguaging can be drawn upon in a planned way that gives access to monolingual languaging as well as bilingual languaging. Abdulatief et al. (2021) show how engaging in critical pedagogic translanguaging is a way to delink from colonial language ideologies. Thus, scholars also report on translanguaging as a deliberate and effective means of navigating complex literacy practices such as holding thoughtful discussions of grade-level literature and content. In the absence of formally designed bilingual and multilingual teacher education courses, 'there is a need for the development of systematic and appropriate use of both languages [*for example, English and isiXhosa*] in the classroom' (Probyn, 2015:220), a need for pedagogic translanguaging. Probyn

(2015) also posits that this should be backed by appropriate resources, which will bridge the current gap between languages and modes in practices that open access to the curriculum.

Research methods and design - A linguistic ethnographic case study

This is a qualitative and linguistic ethnographic case study Copland and Creese (2015) define linguistic ethnography as:

> [*A*]n interpretive approach which studies the local and immediate actions of actors from their point of view and considers how these interactions are embedded in wider social contexts and structures. (p. 2)

It calls for a 'combined examination of language and cultural practices' as a single unit of analysis (2015:13). The social processes in this study involve the teacher's communication with her learners in a mathematics lesson. Guzula and Abdulatief, the two authors of this article, together with a team of researchers from four universities in South Africa, implemented a bilingual education intervention and linguistic ethnographic project called L4L in 10 schools in the Western Cape province. The aim is to support teachers to implement and research translingual pedagogies in mathematics and science classrooms while also improving the teaching of English as an additional language. Guzula and Abdulatief were allocated two schools to support teachers and to conduct the research. The project was implemented over a period of 18 months, with each school visited fortnightly (twice a month) (see full description of the L4L project in the introduction of this special issue). In this article the researchers present a small slice of discourse analysis from this larger research project. They used ethnographic methods to collect data, such as classroom observations, still photographs of classroom literacy practices, such as the writing done on the board, posters and the learners' books, audio and video recordings of parts of the lesson, as well as field notes and recordings of interviews and informal conversations with the teacher. This article draws primarily on data transcribed from one of the video recordings of a lesson, as well as field notes of their classroom observations and still photographs from the classroom visits and L4L workshops.

Research context and participants

The research participants are Mrs L, the mathematics teacher, and her learners in one of the schools, whom the researchers followed from 2022 when she taught a Grade 8 mathematics class to 2023 when the same learners progressed to Grade 9. Typical of South African government schools, there were between 45 and 50 learners in the class. The learners' ages were between 13 and 14 years in 2022 and between 14 and 15 years in 2023. Both the teacher Mrs L and the learners had isiXhosa as their home language with Mrs L having bilingual competence in isiXhosa and English and many of the learners being isiXhosa-emergent English bilinguals.

Researchers' roles and positionalities

Both researchers work at the same university in teacher education in applied language and literacy studies. Guzula has isiXhosa and English competencies like those of Mrs L and the learners, among other language resources in her linguistic repertoire, while Abdulatief has English-Afrikaans linguistic competencies in her linguistic repertoire. They were part of the L4L team that provided workshops and input on teachers' materials development activities, discussions and reflections on their teaching, language practices and language ideologies as well as coaching and mentoring in multilingual pedagogies in the classroom between 2022 and 2023. Initially, the researchers visited the school fortnightly, alternating between two schools, and later once a week during this 18-month period when teachers in the other school dropped out and observed Mrs L and learners during school hours. The researchers provided Mrs L with additional multilingual mathematics dictionaries (Figure 4) so that she could translate mathematical terms into isiXhosa for the class. Sometimes the researchers became participant observers and engaged in discussions about the definitions derived from the dictionaries and helped both the teacher and the learners in choosing the most meaningful definitions of concepts from the variety of dictionaries provided. The researchers also engaged in reflective conversations with the teacher and sometimes with the learners after the lessons.

Selection of data and coding

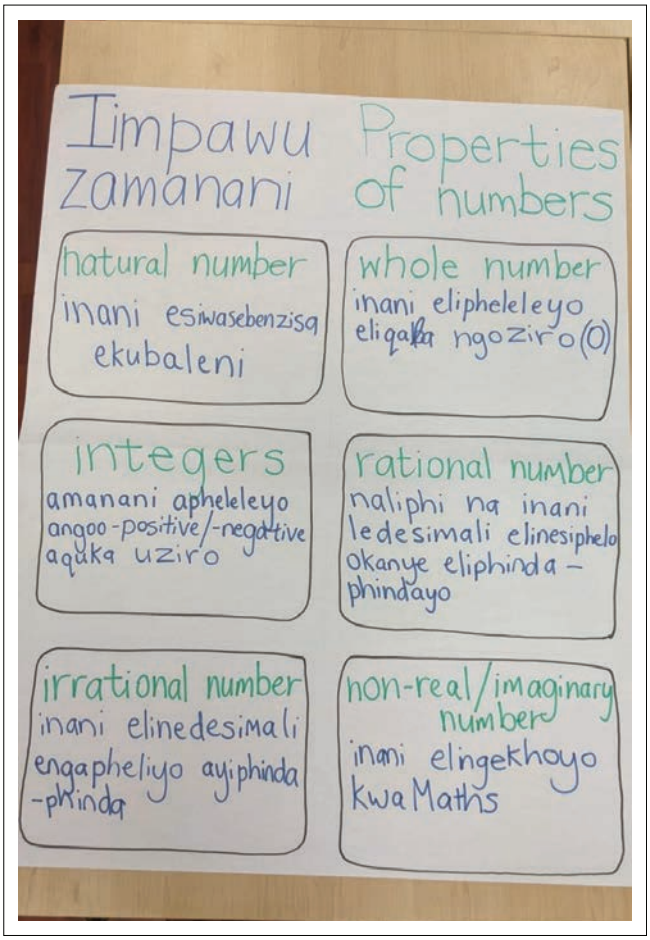
The data selected and transcribed are from one of Mrs L's lessons on factorisation of trinomials. It is representative of her translanguaging pedagogy and practice and is also revealing of possible futures in mathematics instruction. The researchers selected the data from their video recordings of lessons, transcribed a section of the lesson and then the first author translated it. The transcript was analysed by both researchers using discourse analysis and coded thematically to identify the mathematics pedagogy, register (Setati et al., 2002) and translanguaging practices of the teacher and learners.

Data analysis, results, and discussion

The researchers used interactional and discourse analysis as the primary analytical tools, focusing on the classroom interaction, discourse, languaging and translanguaging practices of Mrs L and her learners. Our data analysis focuses on Mrs L's practices, to demonstrate the 'particular dispositions and curriculum arrangements' that she used to create a dynamic bilingual environment for learners around mathematics (Poza, 2019:408). We also focus on the role of the L4L project in supporting the development and expansion of Mrs L's disposition toward translanguaging.

L4L Workshops: Building teacher confidence and subject content knowledge in isiXhosa

Mrs L's poster, seen in Figure 1, a bilingual glossary on the properties of numbers, was created at a L4L workshop where



Source: Languaging for Learning workshop in 2023

FIGURE 1: Mrs L's poster created in the L4L workshop.

teachers were divided into subject area groups and created bilingual posters as a form of classroom support. Teachers negotiated meaning among themselves, used translations, looked up terms on their mobile phones, and used the isiXhosa-English subject content dictionaries provided at the workshop. In Figure 2, we show some of the available resources we used with the teachers.

Although Mrs L only created this one poster as a classroom resource there were additional aspects of translanguaging pedagogy that Mrs L embraced and took up.

Building teacher knowledge: Creating a sound foundation for pedagogical translanguaging

As part of teacher support, the L4L project provided the mathematics teachers with a textbook written in isiXhosa *iMathematika: Amalungiselelo emviwo nemvavanyo, Greyidi 8* by Anne Eadie, Gretel Lampe and Tracy Howie in 2022. The provision of this textbook in one of the L4L workshops was important as it made the following aspects possible: firstly, it provided access to mathematical terms and knowledge in isiXhosa. Secondly, although textbooks and other resources for content knowledge in African languages are slowly being introduced into the market, currently 95% of school textbooks for Grades 4–12 are in English. Providing Mrs L with a free copy of the textbook was important because purchasing this textbook would be beyond the means for learners and many teachers who need them and the books are difficult to find.

The image in Figure 5 shows Mrs L teaching mathematics to the Grade 8 class during 2022. Although Mrs L's training as a mathematics teacher was also in English, her view of language as resource and her awareness of the importance of using isiXhosa as one of the languages of instruction led to her building her isiXhosa content knowledge and her repertoire using the isiXhosa mathematics textbook (Figure 3). Having been trained through the medium of English in her teacher education, Mrs L's knowledge of mathematics in isiXhosa is self-taught and over the 18-month period, the researchers observed her keeping the textbook on her desk and referring to it periodically during the lesson when she wanted to check the isiXhosa terminology.

She also used the textbook alongside the dictionaries made available to her at the workshops and during classroom visits.

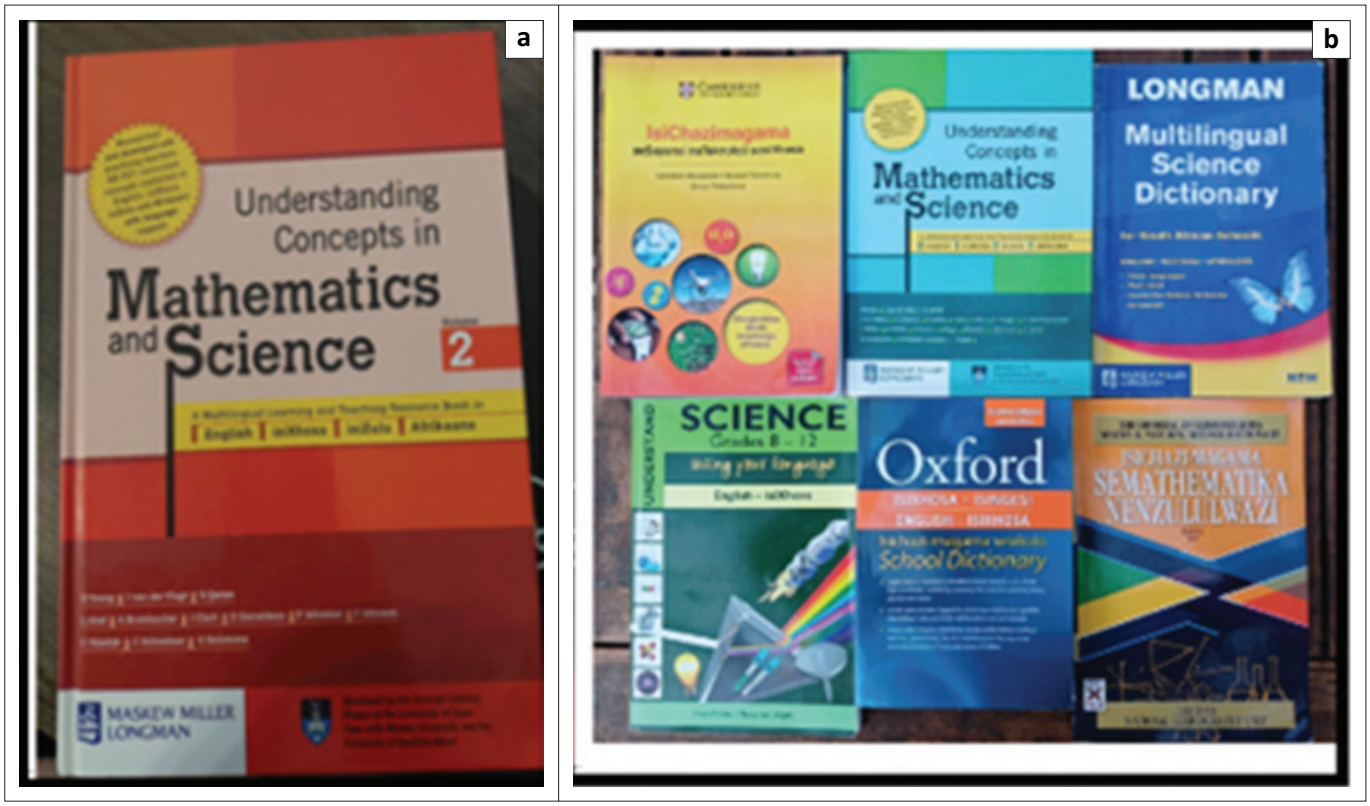
The teacher's disposition and orientation to translanguaging

In her youth, Mrs L attended a public school with isiXhosa-dominant learners and teachers who translanguaged between isiXhosa and English, transgressing the monolingual and Anglonormative school language policies. She thus had formative linguistic experiences like those of her learners and experienced translanguaging practices in her schooling years. It was this formative experience of using isiXhosa in school that created the foundation for her own use of pedagogical translanguaging. She is an established teacher achieving a high pass rate. During our very first visit in Mrs L's class, she was quick to offer us a disclaimer that she uses isiXhosa and English in her lessons, implicitly suggesting to us that if we expect her to use English only, then we are in the wrong place. In doing so, Mrs L demonstrated a 'disposition' towards translanguaging and bilingual teaching in her use of isiXhosa when teaching mathematics and in allowing and encouraging her learners to use their familiar language resources in the mathematics lessons.

Mrs L's classroom as an established translanguaging third space

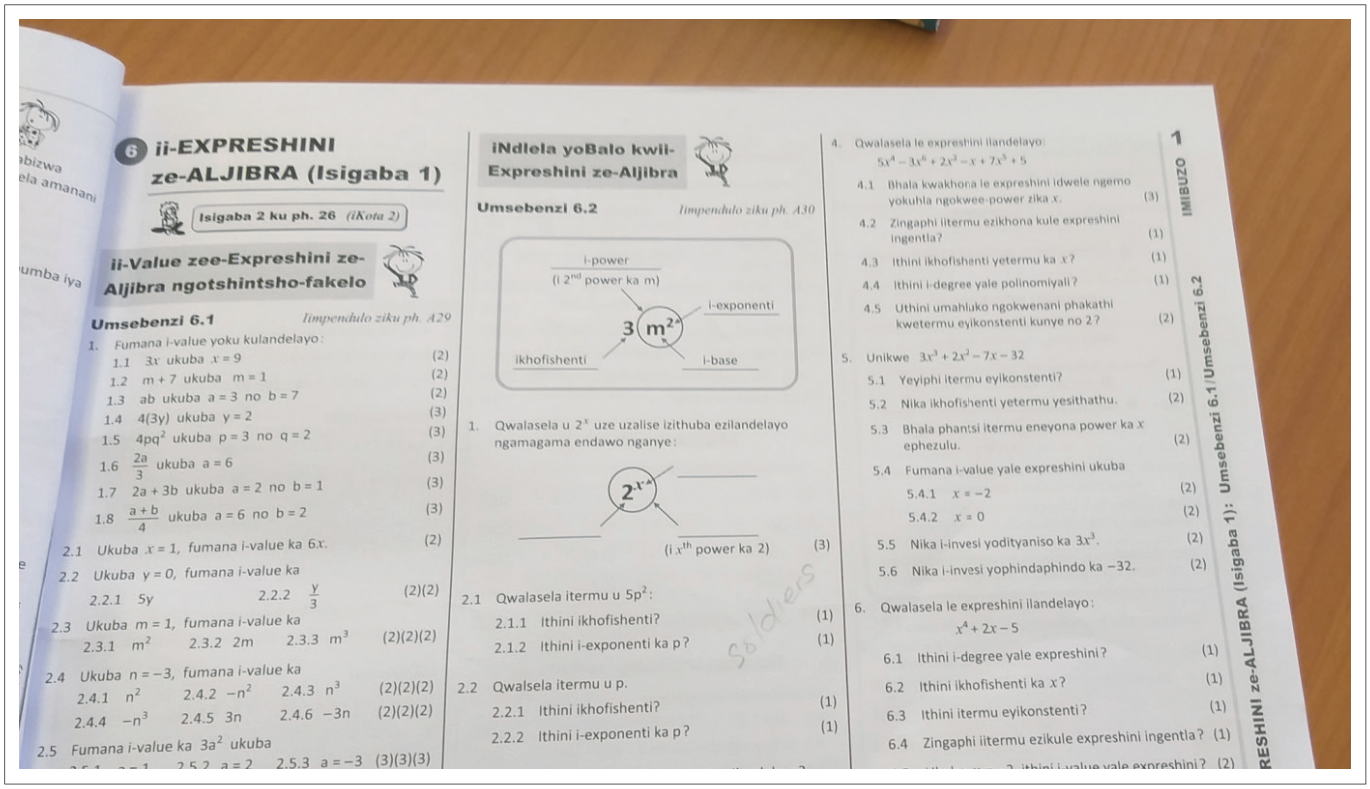
In Figure 5, we see Mrs L writing on the chalkboard in both English and isiXhosa, using translation to ensure that the students have access to both languages and can make meaning in both languages.

In Figure 5, we see an example of Mrs L writing the focus of the lesson first in English, 'Sequencing of numbers in a specific pattern', and then translating it to isiXhosa, '*Indlela alandelelana ngawo amanani*'. Unlike existing language ideologies and language hierarchies that pit learning in an African language against learning in English, Mrs L demonstrates that both languages can be used in tandem rather than in competition to support learning. In this act of translation, Mrs L legitimises



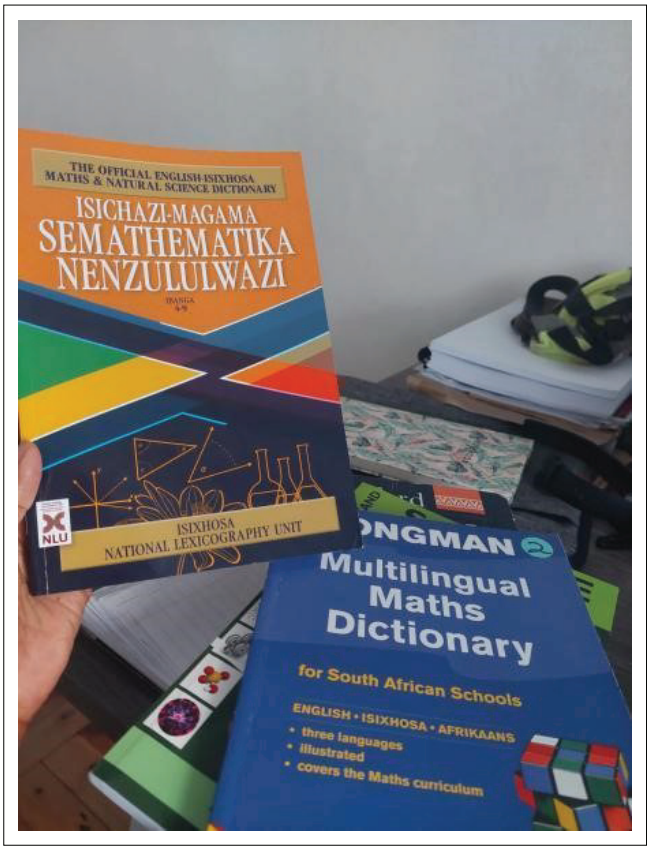
Source: Feza, N., Letsekha, T., Madolo, Y. & Meyiwa, T. (2021); Young, D, Van der Vlugt, J, Qanya, S, et al. (2005); Deyi, S., Minshall, G., & Tokwe, T. (2008); Fricke, I & Van Lingen, N. (2014); OUPSA (2014); SANLU (2013)

FIGURE 2: A collection of various maths and science dictionaries, including an isiXhosa-English language dictionaries: (a) Understanding Concepts in Mathematics and Science (b) top left to right: HSRC illustrated English-isiXhosa maths dictionary: Grade R to 9; Understanding Concepts in Mathematics and Science; Multilingual Maths Dictionary; Bottom left to right: Understand Science Grade 8 - 12 Using your language: English - isiXhosa; Oxford English-Xhosa School Dictionary; isiChazi Magama seMathematika Nenzululwazi – mathematics and Natural Science: Bilingual Dictionary.



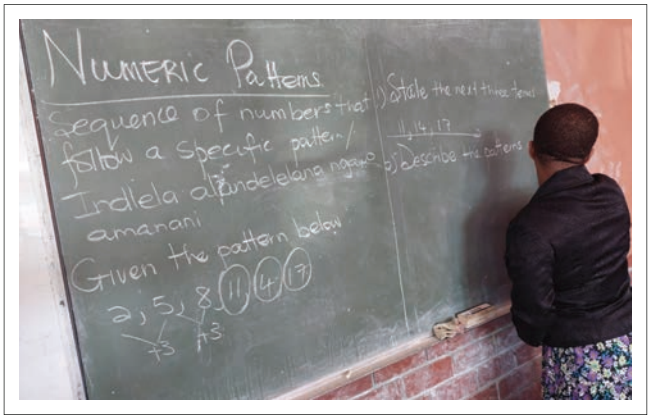
Source: Eadie, A., Lampe, G. & Howie, T., 2022, *iMathematika: Amalungiselelo Emviwo Nemvavanyo. CAPS, Grade 8*. Answer Series

FIGURE 3: An example of a Grade 8 mathematics textbook from the *Answer Series*.



Source: Sanlu, 2013, *isiChazi Magama seMathematika Nenzululwazi – Maths and Natural Science: Bilingual Dictionary*; Deyi, S., Minshall, G. & Tokwe, T., 2008, *Multilingual Maths Dictionary*. Cape Town. Maskew Miller Longman

FIGURE 4: Additional multilingual mathematics dictionaries provided to Mrs L by the L4L researchers.



Source: Image taken on 09 August 2022 by Soraya Abdulatief during classroom observation for Languaging-for-Learning Project

FIGURE 5: Mrs L translating the lesson topic.

the learners' home language as well as her own, provides access to knowledge in their home language and normalises bilingual meaning-making through making it visible.

In the analysis of Table 1, Mrs L's lesson on the factorisation of trinomials below, we see evidence of the practices identified by Poza (2019) as constituting pedagogical translanguaging such as: the use of teacher and peer translation, bilingual recasting, the alternation of the features of named languages, providing multilingual resources in the classroom, using translanguaging and more than one language to support complex subject specific exchanges, and allowing exploratory talk in isiXhosa.

TABLE 1: Class discussion of the factorisation of a trinomial that forms part of Extract 1 (see Appendix 1).

Question line	Identification code	Quotations from class discussion
Line50	T	'What is a trinomial? Who can tell me?'
Line51	T	'*Yintoni le nto kuthwa yitrinomial*? [what is this thing called a trinomial?]'
Line52	T	'*Kuqala yiexpression etheni? Yiza* ... [First, what kind of expression is it? Come ...].'
Line53	L1	'*Uxolo misi, itrinomial yiexpression of ithree terms* [Excuse me miss, a trinomial is an expression of three terms].'
Line54	T	'So *if sithetha ngetri*, tri means three, we've got three terms [So if we talk of tri, tri means three, we've got three terms].'
Line55	T	'*Siyevana, kwithree terms* ... [Do you understand, the three terms ... ?]'
Line56	T	'*Uyandiva* [*L2*]? [Do you understand ... ?]'
Line57	L2	Yes miss.
Line58	T	'*Ubhala ntoni*? [What are you writing?] *Ingathi ubhala ileta*? [You look like you are writing a letter] *Ubhal'imaths*? [Are you writing maths?]'
Line59	L2	'Yes miss.'
Line60	T	'Oooo [*I see*]'
Line61	T	'*So sizakwenza ifactors* [So we are going to do factors].'
Line62	T	'[*E*]arlier *besisenza ifactorisation, okanye ifactorisation between intoni*? [Earlier we were doing factorization, or factorization between what?]'
Line63	T	'*isquares idifference of two squares* [between squares looking at the difference between two squares] *Ubuyaqaphela iiterms zethu bezitheni*? [If you notice our terms...how many were they?] (*Going to the left hand side of the board and pointing) beziyitwo* [there were two of them].'
Line64	T	'*Zisohlulwa yintoni*? [what separated them?] *Yisubtraction* [by subtraction].'
Line65	T	'*Mamela now ngoku xa sithetha ngetrinomial* [It means that we are going to have three terms. Listen now when we speak of trinomial it means that were going to have three terms.']'
Line66	T	'*Sizakubanayo ngoku imiddle term, sijonge how do you factorise itrinomial* [We are going to have a middle term now, and we need to find out how to factorise a trinomial] (*Takes out her Maths Handbook and Study Guide: Maths Made Easy by Kevin Smith for grade 9*)'

T, teacher; L, learner.

Factorisation of trinomials: Analysis of Mrs L's language use in the classroom

Table 1 is a transcript of part of a lesson that revises work that had already been covered in Grade 8 in 2022: Mrs L revised with her Grade 9 class the factorisation of a trinomial.

In Table 1, Mrs L is named as 'T', denoting teacher, and the learners are denoted as 'L'. Mrs L and the learners use English, isiXhosa, and a mixed or meshed register of English and isiXhosa. Thus, they use a hybrid repertoire that transcends the two named languages often seen as separate and bounded. The transcript (indicated in Table 1 as Line) demonstrates that the communication practices of bilingual and multilingual speakers are very different to those of monolinguals. This translingual practice which combines resources of isiXhosa and English is often rejected or undermined by those having a monolingual orientation to language and yet it is the norm for multilingual speakers. Mrs L starts the revision lesson on trinomials by writing, 'Factorisation of a trinomial' in English on the board followed by the is iXhosa translation.

We see Mrs L asks her class in English:

> 'What is a trinomial, who can tell me?' (Line50, Teacher)

After not receiving any learner responses, she then engages in bilingual recasting, translanguages by using a meshed or hybrid register (Tyler, 2016) of mathematical terms in English and isiXhosa and says:

> 'Yintoni le nto kuthwa yitrinomial? [*What is this thing called a trinomial?*]'. (Line51, Teacher)

T52 Mrs L continues with the meshed register and provides the learners with more detail asking:

> 'Kuqala yiexpression etheni? Yiza. [*First, what kind of expression is it? Come*]'. (Line52, Teacher)

Then a learner answers in the same mixed register, '*Uxolo misi, itrinomial yiexpression of ithree terms*. [Excuse me miss, a trinomial is an expression of three terms]' (L1). Mrs L's meshed register includes the words '*yitrinomial*' and '*yiexpression*' and the learner's response includes the words '*itrinomial*', '*yiexpression*' and '*ithree*'. From a monoglossic perspective, this hybridity can be viewed as problematic and often leads to the deficit positioning of multilingual communicators as being 'semilingual' and not knowing either of the two meshed languages.

It could also be argued that Mrs L's use of Xhosalised words such as '*itrinomial*' and '*i expression*' is a strategy for emphasising mathematical terms found in assessments and giving learners access to those terms. Not providing learners with access to the formally recognised language of mathematics that comes with assessments would be setting learners up for failure considering that assessments are still taken in English (Janks, 2004). Mrs L also demonstrates translanguaging as a hybrid repertoire as she moves between monolingual English, the meshed English and isiXhosa register and monolingual isiXhosa. She explains that the prefix 'tri' in English means three when says, 'So if sithetha ngetri, tri means three, we've got three terms'. (T54)

In this single utterance, Mrs L is performing complex languaging as she is both building learners' knowledge of English by explaining the prefix 'tri' and then explaining its use in mathematics: 'we've got three terms'. She also explains this mathematical term in everyday English. 'Trinomial' is in the mathematical register while 'we've got three' is an example of everyday language. This is because emergent bilinguals must learn both the everyday English language and the mathematical language while English speakers only must contend with learning the academic or mathematical registers. Thus, the everyday register is useful in this lesson as it is the foundation upon which to introduce the academic register. In doing so, the teacher can also be seen to be shuttling between registers, what Tyler (2023) terms transregistering. Tyler (2016) shows that in classroom talk to support mathematics learning it is not simply a move from 'everyday' to academic registers but a constant meshing of these registers.

> Mrs L asks one of the learners (L2), '*Siyevana, kwithree terms Tomose?* [*Do you understand the three terms …?*]' (Line55, Teacher) and follows with '*Uyandiva …*? [Do you understand …?]' (Line56, Teacher). Unlike the learner (L1) who replied in the meshed English and isiXhosa another learner (Line57, Learner 2), answers in English by saying, 'Yes miss'.

Mrs L here is checking on learners' understanding. She has in reflections with us stated that she does not want to leave anyone behind. In reflections about the learners' experiences of mathematics in this class, the learners have voiced that they like Mrs L because she does not only move on with those who understand quickly but is patient with the ones who take longer to understand. An example is when Mrs L uses isiXhosa to ask, '*Zisohlulwa yintoni*? [What separated them?]' (Line64, Teacher).

She builds on the previous question to check if the learners understand the step-by-step processes. To conclude this analysis, we argue that Mrs L's use of varied languages, registers and the meshed variety demonstrates that her focus was on fostering the learners' understanding of mathematics and not on the 'correct' or 'incorrect' use of standard English and isiXhosa.

In mathematics, an expression is a combination of numbers, variables, and functions such as addition, subtraction, multiplication, and division. They can be likened to phrases in language but are numerical in mathematics, for example $x + 3$ is an expression. In words it would read, *the sum of x and 3.* The x and 3 are terms 1 and 2, making it a binomial. If we add 7, as in $x + 3 + 7$, then 7 is a third term and thus $x + 3 + 7$ becomes a trinomial, an expression of three terms. Trinomials are algebraic expressions with an etymology from Latin. 'Tri' and 'trias' mean three in Latin and Greek and 'nomen' means name in Latin. This means therefore that trinomial is not an original English word but one that has been derived from Latin. Given that there are almost no isiXhosa resources for teaching mathematics, it is unrealistic to expect the teacher and learners to have original isiXhosa terms for algebraic expressions that have their etymology in Latin and Greek. As 'trinomial' is a discipline-specific word, as well as an appropriated term, it is unfair to even argue that the learners do not know English because even the English learners would still need an explanation of what a trinomial is. In fact, English uses a hybrid repertoire itself, meaning it has been flexible and open to all forms of languaging including clustering semantic features to make compound words and taking on transliterated words and forming new 'English' words from them where they did not have equivalents. Garcia and Lin (2018) point out that the multilingual roots of English are mostly ignored or not recognised. This hybridity is not expected for African languages that have many borrowed terms in their standard variety already. English and Afrikaans also did not try to coin new words when there could be ambivalence about their meanings. Consequently, if learners already understand 'tri' to mean three as they have responded to the teacher that a trinomial is an expression of three terms, then saying the word 'itrinomial' is

not an indication of their lack of understanding of mathematics even though linguistically they might not have an isiXhosa equivalent word. However, given the Anglonormativity of education, it is to be expected that the learners will have learned mathematics vocabulary in English more than in isiXhosa from Grade 4 onwards. The learners draw from both their familiar resources including using English words already internalised and available in their vocabulary. Thus, expecting them to find words as yet unknown to them in isiXhosa would be another form of silencing.

In Table 2, we can see the step-by-step approach Mrs L takes and her use of joint construction with the learners to ensure that they understand factorisation. As Mrs L continues with the lesson, she uses English, asking:

> 'Here what are we going to do? What is the number that is multiplied by itself to get the first term?' (Line74, Teacher)

She speaks in English and the learners provide the correct answer '*x*' (Line75, Teacher). Then Mrs L uses a meshed register of English and mainly isiXhosa when she says:

> '*x because x sizakubeka ux apha*' [*x* because the other *x* we will put here {outside the bracket}] … *omnye simbeke phi*? [and where do we put the other?]' (Line76, Teacher)
>
> The learners answer her in English, 'inside the bracket'. (Line76, Learners) Mrs L is allowing some learners who can answer in English, to do so, but also allows learners to answer in the mixed register. She provides an explanation of the placement of *x* and the placement of the brackets by saying, '*x* because x^2 is equal to *x* multiplied by *x*'. (Line78, Teacher) Mrs L's pedagogy is demonstrated when she asks the learners, 'What are the factors of 6?' (T81) One learner replies, '3' (T82 and another replies, '*ngu2* [it is 2]' (Line83, Learner 3). Mrs L then asks, '*ngubani*? [what?]' (Line84, Teacher).

TABLE 2: Factorisation of a trinomial as a step-by-step approach to teaching mathematics (see Appendix 1).

Question line	Identification code	Quotations from class discussion
Line74	T	'Here what are we going to do? What is the number that is multiplied by itself to get the first term?'
Line75	L5	'*x*'
Line76	T	'*x* because *x* … , *sizakubeka ux apha* [*x* because the other *x* we will put here (*outside the bracket*)] *omnye simbeke phi*? [and where do we put the other?]'
Line77	L5	'Inside the bracket.'
Line78	T	'*x* (*x*) because *x*2 is equal to *x* multiplied by *x*'
Line79	T	'Now we are going to skip this one (*pointing to 7x*), *middle term size kubani*? [middle term to which term?]'
Line80	T	'*Size kwilast term*. [come to the last term].'
Line81	T	'What are the factors of 6?'
Line82	L3	'3'
Line83	L5	'*Ngu 2* [It is 2].'
Line84	T	'*Ngubani*? [What?]'
Line85	L5	'*Ngu* 2 [It is 2].'
Line86	T	'*Ngawaphi amanani amabini ongawamultiplyaya akunike u 6, masitsho*. [Which two numbers can we multiply and get 6, let's put it that way].'
Line87	L5	'Ngu *2 no 3* [It is 2 and 3].'
Line88	L5	'It is 1 × 6 (*Here factors of* 6 *were given as* 2 × 3 *and* 1 × 6).'
Line89	T	*'Ngubani umntu onokusichazela ukuba sitsheka ntoni*? [Who is going to explain for us their understanding of what we check for?]'

T, teacher; L, learner.

Seeing that her learners are uncertain, she rephrases the question:

> '*Ngawaphi amanani amabini ongawamultiplaya akunike u6, masitsho*? [which two numbers can we multiply and get 6, let's put it that way?]'. (Line86, Teacher)

In Line87, Mrs L restates Line82 where she asked what the factors are of 6, after noticing that learners are just giving one number at a time instead of two numbers that can be multiplied to give 6. Rephrasing the question is a good pedagogical strategy as it shows the teacher's reflection in action: thinking on the spot and correcting her questioning (Reed et al., 2002). Mrs L does this in a hybrid repertoire of isiXhosa and English and mixed standard and non-standard variety. Thus, the teacher is working with linguistic diversity all the time in ensuring access to the content. In the process, Mrs L explains factors as two numbers that can be multiplied to give 6. The learners then reply, '*Ngu2 no3* [It is 2 and 3]' (Line87, Learner 5). Other learners reply, 'It is 1 × 6' (Line88, Teacher).

The learners give correct responses in a hybrid repertoire as well because they have understood the question which has been posed in a familiar repertoire. Again here, we can see that value is placed on mathematics and not on the varieties of language used.

Mrs L's step-by-step approach demonstrates the point that:

> 'quality mathematics teaching and learning, which can lead to learner success, involves much more than fluency in the LoLT [*in this case English*]'

Teacher pedagogy and supportive practices such as using the learners' home language, isiXhosa, or translanguaging lends itself to multilingual participation toward the learning of mathematics (Setati et al., 2009:73).

We argue that it is a combination of factors that makes Mrs L's practices a significant model for teaching bilingual and multilingual learners. These include:

- Mrs L's positive disposition to learning and translanguaging.
- Grounding her demonstrations and calculations in mathematics by defining and having learners know the definitions, functions and values of the placement and symbols in calculations.
- Drawing on her own linguistic resources to teach her class.
- Her step-by-step approach with the learners in solving problems on the board.

Mrs L's pedagogy also includes asking the learners to come to the board and do calculations (Cardozo-Gaibisso, Dominguez, Harman & Buxton, 2023). Although this is not unusual in classrooms, Mrs L allows the rest of the class to ask the learner at the board questions in isiXhosa. The learner doing the calculations at the board may also ask the class for help in isiXhosa should they need it. Mrs L's focus here is on granting learners epistemic access by allowing them to use

isiXhosa and also allowing them to ask fellow learners for help with the calculations should they need it.

Conclusion

In supporting Mrs L's disposition towards (trans)languaging in her mathematical classroom, we discovered that Mrs. L had experience with translanguaging as a student, then had monolingual teacher preparation that muted her translanguaging. But she still had a disposition towards it, which the L4L project helped her reignite to develop her experience and disposition into an intentional and explicit translanguaging pedagogical stance and practice. Her positive disposition to translanguaging enabled her to draw on her formative experiences with translanguaging to support her learners providing them with epistemic access to mathematics in their home language and English. To reignite her translanguaging disposition, the project made multilingual resources such as an isiXhosa textbook and mathematics dictionaries available to her. The knowledge shared in the workshops and discussions with the researchers and mentors also played a role in supporting Mrs L's development in pedagogical translanguaging. We also recognise that the teacher had sound pedagogical strategies for teaching mathematics. Her use of joint problem-solving strategies with the learners is particularly important. Her acceptance of their answers in their full linguistic repertoires means that learners can speak freely and there is thus more risk-taking and willingness to contribute and respond from learners. We argue that Mrs L had a strong disposition to translanguaging as her languaging meshes the mathematical register with everyday language, but she ensures that the learners also have access to the valued academic register. In her classroom, Mrs L constituted 'multilingual learners' language practices as assets that can be leveraged in the mathematics classroom rather than deficits that must be overcome' (Marshall et al., 2023:2). The pedagogical significance of Mrs L's use of translanguaging and her legitimising the use of learners' familiar language resources helped to 'deepen multilingual learners' productive disciplinary engagement by expanding the resources available to do mathematical work' (Marshall et al., 2023:2). In legitimising the use of isiXhosa in the classroom, Mrs L does not place 'monolingual expectations' on bilingual and multilingual learners (Poza, 2019:408). Finally, in our efforts to promote the use of African languages in schooling, we argue for keeping our sights fixed on the goal of learners' meaning-making. Debates about correct terminology and language purity should not be allowed to stifle learners' meaning-making.

Acknowledgements

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

Both authors, X.G. and S.A., conceptualised the article and initially drafted different parts of the article, for example analysis and theory, introduction and methodology and then they swapped the work around adding to each other's contributions. They also contributed to the revision and editing of the article.

Ethical considerations

An application for full ethical approval was made to the University of Western Cape Research Ethics Committee Officer, and ethics consent was received on 13 April 2022. The ethics approval number is HS22/2/10. Authors obtained informed consent from participants for taking photographs and use is appropriately and according to ethical standards in and for research.

Funding information

The authors disclosed receipt of the following financial support for the research of this article. This work was supported by the Zenex Foundation.

Data availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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Appendix starts on the next page →

Appendix 1

Longer transcript

Factorisation of a trinomial

$x^2 + 7x + 6$

T: Writes on the board and says - Factorisation of a trinomial.
50 T: What is a trinomial? Who can tell me?
51 T: *Yintoni le nto kuthwa yitrinomial*? [what is this thing called a trinomial?].
52 T: *Kuqala yiexpression etheni? Yiza* ... [First, what kind of expression is it? Come...].
53 L: *Uxolo misi, itrinomial yiexpression of ithree terms* [Excuse me miss, a trinomial is an expression of three terms].
54 T: So if *sithetha ngetri, tri* means three, we've got three terms [so if we talk of tri, tri means three, we've got three terms].
55 T: *Siyevana, kwithree* terms *Tomose* [Do you understand, the three terms Tomose?]
56 T: *Uyandiva* Tomose? [Do you understand Tomose?]
57 Tomose: Yes miss.
58 T: *Ubhala ntoni*? [What are you writing?] *Ingathi ubhala ileta*? [You look like you are writing a letter] *Ubhal'imaths*? [Are you writing maths?]
59 Tomose: Yes miss.
60 T: 0000
61 T: *So sizakwenza ifactors* [So we are going to do factors].
62 T: earlier *besisenza ifactorisation*, *okanye ifactorisation between intoni*? [earlier we were doing factorization, or factorization between what?]
63 T: *isquares idifference of two squares*. [between squares looking at the difference between two squares] *Ubuyaqaphela iiterms zethu bezitheni*? [If you notice our terms...how many were they? *going to the left hand side of the board and pointing*] *beziyitwo* [there were two of them].
64 T: *Zisohlulwa yintoni*? [what separated them?] *Yisubtraction* [by subtraction].
65 T: *Mamela now ngoku xa sithetha ngetrinomial* it means that we are going to have three terms. [Listen now when we speak of trinomial it means that we are going to have three terms].
66 T: *Sizakubanayo ngoku imiddle term, sijonge* how do you factorise *itrinomial* [we are going to have a middle term now, and we need to find out how to factorise a trinomial] (takes out her Maths Handbook and Study Guide: *Maths Made Easy* by Kevin Smith for Grade 9).

End Extract 1

67 T: *Shame ukuba umntu akayibambanga kuza kubanzima because sidadela enzulwini*. [Shame if you don't get this it is going to be difficult because we are going deeper now].
68 T: Let me give you the simple one which is *epositive yonke*. [Let me give you a simple one that is all positive].
69 T: Let us say we are given
$x^2 + 7x + 6$
70 T: this is a trinomial. *Siyevana*? [do we understand?].
71 T: Same thing applies. You have to open two brackets as *ba besisenza phayana kwidifference* [as we did where we were calculating the difference] of two squares because *nalapha le trinomial iphuma xa sithetha ngefactorisation* [because even here the trinomial is calculated via factorisation], *sireversa we are reversing intoni iproduct* [we are reversing what, the product].
72 T: *Siyareversa ba bekumultiplaywe ntoni*? [We reverse and find out what it was multiplied by] Because this is the sum of intoni iproduct (*of the product*), so *bekukhona izinto ebezimultiplayiwe ukuze kuphume le nto* [there were things that were multiplied for us to get the product] *so sifuna ukujonga ukuba zintoni ezi bezimultiplayiwe*? [we want to find out what was multiplied] *Zibrackets ezimbini*, but we don't know what is it *ebikhona kweza brackets* [we see two brackets but we don't know what was in the brackets].
73 T: so let us open the brackets.

Extract 2: Factorisation of a trinomial continued: $x^2 + 7x + 6$

Mrs. L translanguages and uses a to step-by-step approach to teaching mathematics

74 T: Here what are we going to do? What is the number that is multiplied by itself to get the first term?
75 Ls: x
76 T: x because x..., *sizakubeka ux apha* [x because the other x we will put here, outside the bracket] omnye simbeke phi? [and where do we put the other?]
77 Ls: inside the bracket.
78 T: x (x) because x^2 is equal to x multiplied by x.
79 T: Now we are going to skip this one (*pointing to 7x*), middle term *size kubani*? [middle turn to which term?]
80 T: *size kwilast term*. [come to the last term].
81 T: What are the factors of 6 ?

82 Ls: 3
83 Ls: *ngu* 2 [it is 2].
84 T: *ngubani*? [what?]
85 Ls: *ngu*2 [it is 2].
86 T: *Ngawaphi amanani amabini ongawamultiplyaya akunike u6, masitsho*. [which two numbers can we multiply and get 6, let's put it that way].
87 Ls: *ngu2 no 3* [It is 2 and 3].
88 Ls: It is 1 × 6 [Here factors of 6 were given as 2 × 3 and 1 × 6].
89 T: *Ngubani umntu onokusichazela ukuba uvile ukuba sitsheka ntoni*? [Who is going to explain for us their understanding of what we check for?]

End Extract 2

90 T: Malixole?
91 Malixole: *Uxolo misi mna ndicinga ukuba sitsheka la 2x3 uphezulu* [excuse me miss I think we check that 2 × 3 above]
92 T: *ezi factors nhe*? [These factors hey?]
93 Malixole: Yes
94 T: *Ukuba zitheni*? [What about them?]
(On the board we see... x squared + 7x +6)
x squared (x+2) (x+3)
x squared (x+1) (x+6)
95 Malixole: *Ukuba angaphuma na u7x*, *imiddle term* [whether they will give us the 7x in the middle term].
96 T: *Besidibanisa, besifuna into yokuqala iifactors zika6, the last term* [We were adding, we wanted to find out first factors of six].
97 T: *Two numbers esingazimultiplayayo zikhuphe bani*? [two numbers that we can multiply and get what?]
98 T: (*with learners*) *u6*
99 T: *Into esiyitshekayo apha*, [what we are checking here] *if sisebenzisa* ezi, [if we choose to use these numbers] *because thina sikhethe ezi iifactors* [because we chose these factors {*pointing to* 2 × 3 and 1 × 6}] *zezona ziright* [they are the correct ones].
100 T: alright, *sizama ukujustifaya ke ngoku ukuba* [we are trying to justify] why these factors are the right ones (*pointing to* 1 × 6) or why these (2 × 3) factors are wrong
101 T: *but saqonda masiziliste zonke iinumbers ezimbini ezikhupha bani*? [but we decided to list them all numbers that we can multiply to give us?] *Usix, xa sizithini*? [six, when we do what?] *Xa sizitime*(*za*) [when we times them].
102 T: *Then ke ngoku, xa sizifumene, before sizikhethe ke ngoku, sijonge ukuba zeziphi esizakuthi xa sizidibanisa zisinike le middle term*. [Then now when we have found them and then selected them then we look at which one will give us the middle term when we add them] (*pointing to 7x*).
103 T: *Iyavakala nhe*? [You understand] *nhe*?
104 L: Yes miss.
105 T *So singabhala ke ngoku*. [So we can write now]. *So yonke le nto ibingumtsheko nje*. [In all this we were just checking understanding].
106 Ls: we are safe.
107 T: *sigqibile ke ngoku*? [are we done now?] *Ndinganinika omnye umzekelo* [I can give you another example] Ls: Yes miss!