

The Role of Translanguaging in Teaching Mathematics at Adult Correctional Centre Classrooms in South Africa



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ABSTRACT

This paper sought to explore the use of the translanguaging strategy as the means for decolonising and advancing the teaching of mathematics procedural fluency. From the pragmatic epistemological stance, the study collected both qualitative and quantitative data from the group of fifty purposively sampled adult offenders. The intervention study inferred data from pre-tests, post-tests, and semi-structured interviews. The data, which was analysed using SPSS and the thematic analysis approach, through the conceptual framework of teaching adult offenders mathematics procedural fluency through the isiZulu-English translanguaging strategy, indicate that the use of the translanguaging strategy yields satisfactory performance in adult offenders' mathematics procedural fluency. The study further discovered that the translanguaging strategy leads to the decolonization of the mathematics curriculum and the development of isiZulu and English languages in correctional centre classrooms. The researcher recommends the use of the translanguaging strategy and fluidity in the use of any repertoires in the teaching of mathematics procedural fluency, conceptual understanding, and factual knowledge within the context of correctional centre classrooms. The researcher further concludes that translanguaging is applicable, and resourceful in all mathematics educational contexts, and it leads to the decolonization of the mathematics curriculum for both children and adults, in all contexts. The paper contributed to the scholarship by exploring the mathematics learning, teaching and assessment processes and the role of translanguaging thereof in correctional centre classrooms.

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INTRODUCTION

The South African state of mathematics education is arguably something other than disastrous, particularly in the early years of formal schooling. The latterly stated claim is supported by academic research findings as well as local and international assessments of mathematics achievement.¹ Different scholars attribute different factors to poor mathematics performance., Visser et al. for instance, discuss the non-feasibility of learning environments as the primary factor ascribed to the underperformance of mathematics in the

¹ Nicholas Spaull, "South Africa's Education Crisis: The Quality of Education in South Africa 1994-2011," *Johannesburg: Centre for Development and Enterprise* 21, no. 1 (2013): 1–65.

foundation and intermediate phases.² On the other hand, poverty and unavailability of teaching and learning resources are considered controlling variables for poor performance in numeracy and literacy.³

According to Kotze, only 16% of grade three learners are performing at the grade three level.⁴ Furthermore, Howie et al. argue that grade two learners struggle to benchmark with their international counterparts because their performance is 0.3 standard deviations lower than those of their European counterparts.⁵ The latter arguments are legitimate; however, it is paramount to note the contextual gap, which is that, the latter scholars discuss the substandard performance in mathematics and numeracy understanding for children. The question “Do the findings posited above translate satisfactorily to adult early mathematics performance?” is worth asking. Furthermore, given the widescale of adult mathematics education and the broad range thereof in teaching and learning practices as per the given context,⁶ the learning of, the performance in, and the pedagogical practice(s) employable in mathematics adult education in different adult learning contexts is the phenomenon worth of academic intervention. For example, the way adults in correctional centre facilities perform in and are taught mathematics is to be explored in depth, because, amongst other various reasons, mathematics, and the situational setting within which it is taught are arguably correlational and interwoven.⁷

According to Spaul, the topic of language in education is a contentious one internationally, and this is particularly the case in the South African context.⁸ While Spaul’s “contentious” perspective of language in education is subject to ubiquitous interpretations, the researcher contextualises the “contentious” nature of language education within adult mathematics education.⁹ In other words, the paper sought to explore the correlation between the translanguaging strategy and the adults’ performance in mathematics in the context of correctional centre classrooms. Language and the use thereof in mathematics education is perceived from three broader conceptualizations, which are; language as a right, language as a resource and language as a problem.¹⁰ The three conceptualizations are, according to the latter scholars, intertwined and dependent on each other (see the diagrammatical representation in Figure 1 below).

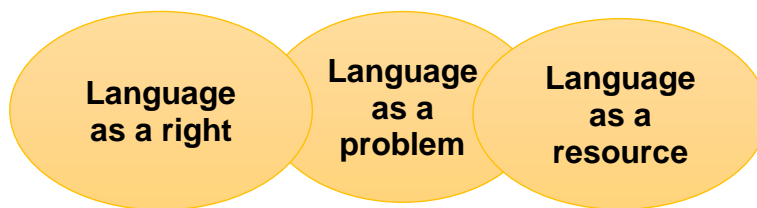


Figure 1: The three conceptualizations of language

Language, in this paper, is conceptualized as a resource to be managed, developed, and conserved in the context of mathematics procedural fluency in correctional centre classrooms.¹¹ Furthermore, given

² Mariette Visser, Andrea Juan, and Nosisi Feza, “Home and School Resources as Predictors of Mathematics Performance in South Africa,” *South African Journal of Education* 35, no. 1 (2015).

³ Nicholas Spaul, “Poverty & Privilege: Primary School Inequality in South Africa,” *International Journal of Educational Development* 33, no. 5 (2013): 436–47; Vijay Reddy et al., “Mathematics Achievement and the Inequality Gap: TIMSS 1995 to 2015,” *South African Schooling: The Enigma of Inequality: A Study of the Present Situation and Future Possibilities*, 2019, 169–87.

⁴ Hanti Kotze, “Competencies in Mathematical Modelling Tasks: An Error Analysis,” *EURASIA Journal of Mathematics, Science and Technology Education* 14, no. 8 (2018): em1567.

⁵ Sarah Howie et al., *PIRLS Literacy 2016: Progress in International Reading Literacy Study 2016: South African Children’s Reading Literacy Achievement* (Centre for Evaluation and Assessment (CEA), Faculty of Education, University ..., 2017).

⁶ David K Evans and Susannah Hares, “Should Governments and Donors Prioritize Investments in Foundational Literacy and Numeracy?” (Center for Global Development, 2021).

⁷ W D Pratiwi, E Susanti, and J Araiku, “Supporting Mathematics Learning in Situational-Referential Phase with Emergent Modeling,” in *Journal of Physics: Conference Series*, vol. 1480 (IOP Publishing, 2020), 012002.

⁸ Nicholas Spaul, “Disentangling the Language Effect in South African Schools: Measuring the Impact of ‘Language of Assessment’ in Grade 3 Literacy and Numeracy,” *South African Journal of Childhood Education* 6, no. 1 (2016): 1–20.

⁹ Spaul, “Disentangling the Language Effect in South African Schools: Measuring the Impact of ‘Language of Assessment’ in Grade 3 Literacy and Numeracy.”

¹⁰ Nuria Planas, “Language as Resource: A Key Notion for Understanding the Complexity of Mathematics Learning,” *Educational Studies in Mathematics* 98, no. 3 (2018): 215–29; Núria Planas and Mamokgethi Setati-Phakeng, “On the Process of Gaining Language as a Resource in Mathematics Education,” *ZDM* 46 (2014): 883–93.

the plethora of language uses and (or) strategies in the teaching and learning of mathematics [i.e code-switching¹² ¹³; translanguaging¹⁴], the paper focuses on the use of translanguaging strategy and the impact thereof in the development of adult offenders' procedural fluency in the early stages of formal mathematics learning.

Where the present study differs from the preceding scholarly works which focus on translanguaging in the teaching and learning of mathematics is that it [the present study] focuses on qualitatively and quantitatively representing the correlation between translanguaging and mathematics procedural fluency in adult correctional centre classrooms. The correlation between translanguaging and adult mathematics procedural fluency in correctional centres is paramount because it supplements the existing scholarly findings by looking into the unique (correctional centre) context and by narrowing mathematics education into procedural fluency, rather than drawing the conclusion from generic mathematics learning context. The core research questions which animate this study are as follows:

- How does the use of translanguaging strategy influence the procedural fluency of mathematics in adult correctional centre classrooms?
- How can the decolonization of mathematics curriculum be attributed to the use of translanguaging in correctional centre classrooms?

To address these questions, the researcher uses the **QUANT-QUAL** explanatory sequential mixed methods research design, wherein the quantitative data which are inferred from pre-test and post-test scores are analysed by using the *t*-test. The qualitative data, on the other hand, will be collected from adult offenders through semi-structured interviews.

LITERATURE REVIEW

The review of literature is arranged as illustrated in the diagram in Figure 2 below.

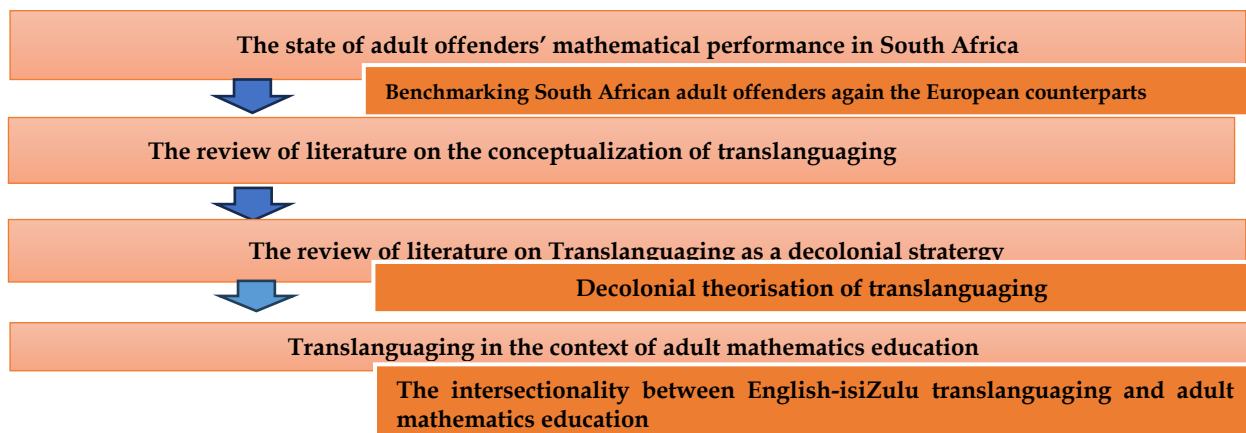


Figure 2: The literature review layout

The State of Adult Offenders' Mathematical Performance in South Africa

Offender education, in the general sense, is an approach to advance the social behavioral transformation of offenders for the purposes of rehabilitation and reintegration into society.¹⁵ Unlike in the European countries, the South African literature on offender education as a means of rehabilitation does not focus

¹¹ Richard Ruiz, "Orientations in Language Planning," *NABE Journal* 8, no. 2 (1984): 15–34.

¹² Setati, Mamokgethi, Jill Adler, Yvonne Reed, and Abdool Bapoo. "Incomplete journeys: Code-switching and other language practices in mathematics, science and English language classrooms in South Africa." *Language and education* 16, no. 2 (2002): 128-149.

¹³ Lyn Webb and Paul Webb, "Introducing Discussion into Multilingual Mathematics Classrooms: An Issue of Code Switching?," *Pythagoras* 2008, no. 1 (2008): 26–32.

¹⁴ Carlos Alberto Mejia Colindres, "The Role of Translanguaging in Latino Mathematics Classrooms," 2015; Núria Planas and Anna Chronaki, "Multilingual Mathematics Learning from a Dialogic-Translanguaging Perspective," in *Classroom Research on Mathematics and Language* (Routledge, 2021), 151–66; Kevin W H Tai, "Creating Translanguaging Spaces in a Hong Kong English Medium Instruction Mathematics Classroom: A Comparative Analysis of Classroom Interactions with and without the Use of iPad," *Linguistics and Education* 78 (2023): 101227.

¹⁵ Andile Nelani, "The Role of Reading in Offender Rehabilitation and Reintegration into the Community in the Western Cape Metro, South Africa.," *Mousaion* 38, no. 3 (2020).

on an individual, specific learning area and the role thereof in the rehabilitation process. The scholarly literature by some scholars, for example, discusses offender education in a general sense, with no specifications on a particular learning area and its unique contribution to the rehabilitation process of an individual offender.¹⁶ Furthermore, qualitative, quantitative, and large-scale studies on adult offenders' formal education performance and the rationale thereof are generic in nature. For example, Orton explored the rationale behind providing prisoners with educational opportunities, their (offenders') overall performance in educational programmes as well as challenges and barriers that prisoners are exposed to behind bars.¹⁷ While Gasa's findings reveal that the aggregate performance level of offenders was significantly higher in the year 2012, with a statistical range of 65 and a median of 54 in the average performance of the 70 sampled offenders, the question of how offenders performed in mathematics specifically is worth asking. Furthermore, Mokoele's quantitative study on offenders' formal education performance reveals that in 2008, 2009, and 2010, the number of offenders who failed Adult Education and Training(AET) Level Four was significantly lower (see the graph below).¹⁸

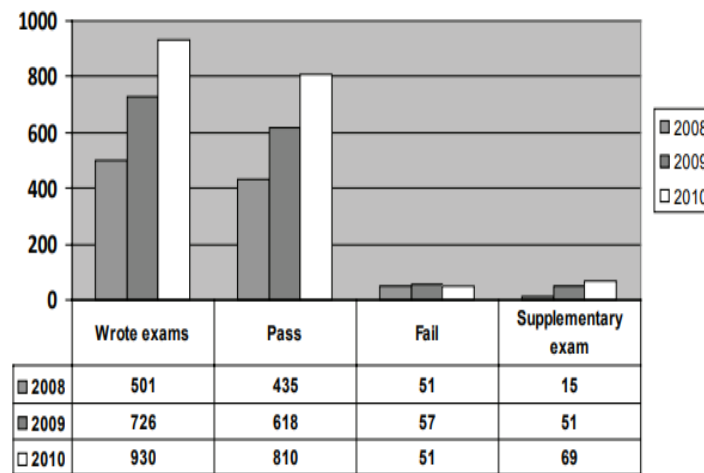


Figure 3: The aggregate performance of AET level four adult offenders in 2008, 2009 and 2010

In light of the scholarly indications reviews above, there is, what the researcher perceives as the “conceptual” gap because the generic view of the state of adult offender education cannot be used to generalize, and it does not translate (at least not satisfactory) to the understanding of the state of adult offender mathematics education. Henceforth, there is limited literature on the performance of adult offenders in mathematics, and the role of mathematics education in the rehabilitation process.

Benchmarking Adult Offenders’ Mathematics Education against the European Counterparts

The state of South African adult offenders’ mathematics performance cannot be sufficiently compared to the state of their European counterparts, because there is limited scholarly literature on how South African adult offenders perform in mathematics. The researcher, however, used the literature and the findings from large-scale studies on children’s mathematics performance to compare (at least) the general South African early mathematics performance with the European adult offender’s mathematics performance. Studies in mathematics, neuroscience and developmental psychology all confirm that adults learn mathematics differently from children. Bannerman et al. and Eichenbaum argue that the hippocampal brain function of

¹⁶ Fikile M Mnisi, “Ethics Education in Prison: A Pilot Study on an Ethics Programme for Offenders,” *International Journal of Ethics Education* 5, no. 1 (2020): 83–96; Michelle Botha, “Blindness, Rehabilitation and Identity: A Critical Investigation of Discourses of Rehabilitation in South African Non-Profit Organisations for Visually Impaired Persons,” 2021; Winnie Nkoana et al., “Understanding the Educational Needs of Young Offenders: A Prevalence Study of Traumatic Brain Injury and Learning Disabilities,” *International Journal of Educational Development* 78 (2020): 102261; Emmison Muleya, “Thinking about Offender Social Reintegration: A Case Study of One NGO Programme in the Eastern Cape Province of South Africa,” *International Social Work* 65, no. 5 (2022): 1034–42.
¹⁷ Bev Orton, “Corrective Rapes: Rape Narratives in South Africa,” in *Violence and War in Culture and the Media* (Routledge, 2013), 260–74.
¹⁸ Matata Mokoele, “Correctional Sentence Plan: A Pathway to Adult Correctional Education,” *Adult Learning* 27, no. 2 (2016): 87–89.

adults stores and retrieves mathematical data differently from the children's hippocampus because, for adults, it [the hippocampus] retrieves data from experiences, and the data retrieved from experiences translates to concepts and mathematical procedures.¹⁹ In other words, adults learn and understand mathematics differently because they use their experiences and their familiarity with the world as the prior knowledge towards and for the learning of mathematics. In this regard, adults' mathematical performance cannot be equated to children's mathematical performance. The researcher, however, used the empirical data from children's performance merely to outline and indicate whether mathematical education in South Africa is fit to benchmark with mathematical education and mathematical performance in European countries.

The Overview of the South African State of Mathematics Performance

The Trends in Mathematics and Science Study, which is a cross-national study which tests the mathematics and science knowledge across all grades in over 60 countries²⁰, indicates that in 2019, the highest percentage of grade nine (9) learners could not reach the international benchmarks of mathematics performance. The study, [which is also presented and analysed in the scholarly works of Adler and Venkat],²¹ reveals that 90% of South African learners could only reach the low international benchmark, while less than 10% could reach the advanced benchmark [see the graph in figure 4 (a) below].

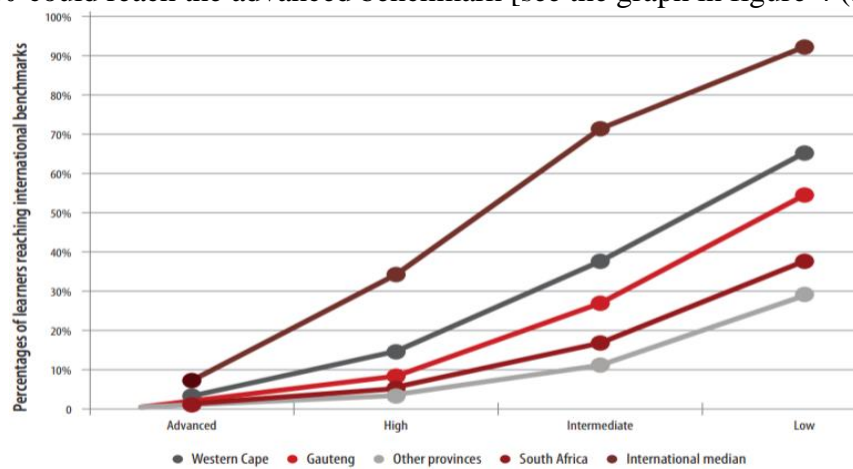


Figure 4(a) : Percentages of learners reaching the international benchmarks by South African provinces

The findings demonstrated in Figure 4(b) below reveal that only 5% of South African grade 9 learners could reach the highest and most advanced benchmark, while 63% could benchmark below the international standards.

¹⁹ D M Bannerman et al., "Regional Dissociations within the Hippocampus—Memory and Anxiety," *Neuroscience & Biobehavioral Reviews* 28, no. 3 (2004): 273–83; Howard Eichenbaum, "The Hippocampus and Mechanisms of Declarative Memory," *Behavioural Brain Research* 103, no. 2 (1999): 123–33.

²⁰ Mullis, Ina VS, Michael O. Martin, Pierre Foy, and Kathleen T. Drucker. *PIRLS 2011 international results in reading*. International Association for the Evaluation of Educational Achievement. Herengracht 487, Amsterdam, 1017 BT, The Netherlands, 2012.

²¹ Jill Adler, "Levering Change: The Contributory Role of a Mathematics Teaching Framework," *ZDM—Mathematics Education* 53, no. 6 (2021): 1207–20; Hamsa Venkat, "Mathematical Literacy: What Is It? And Is It Important?," in *Debates in Mathematics Education* (Routledge, 2020), 210–23.

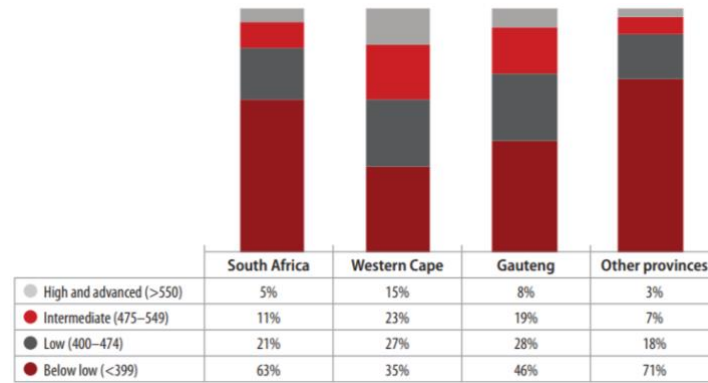


Figure 4(b): Percentages of learners reaching the international benchmarks by provinces

The Trends in Mathematics and Science Study compares South African mathematics learners with at least 40 European countries. Undeniably, socioeconomic factors can be perceived as the controlling variable for poor performance in mathematics. Nonetheless, in the Trends in Mathematics and Science Study of 2020, percentages of Grade 9 learners reaching the respective international benchmarks in mathematics achievement were further arranged according to rich and poor schools, to have the socio-economic factors controlled. The findings from this TIMSS study are analysed and discussed in the scholarly work of Wills and Gondwe as follows:²²

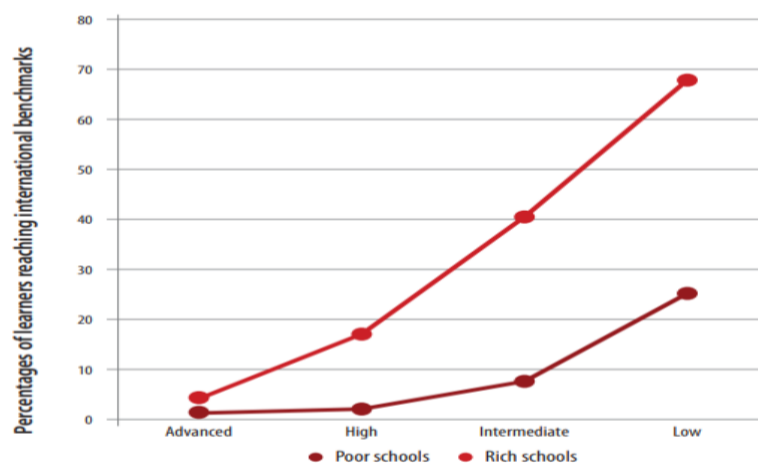


Figure 5: Percentages of learners reaching international benchmarks by rich and poor schools

The State of European Adult Offenders’ Mathematics Performance: The Context of England

England prison authorities focus on prison education to widen the employment prospects for offenders subsequent to incarceration.²³ On the contrary, there are no recent or unambiguous data about the skill levels of the prison population. O’Keefe et al., for instance, discuss the barriers to offender employment after incarceration.²⁴ While these barriers are worth discussion, it is also paramount to investigate the type(s) of skill(s) that offenders possess and the demand(s) thereof in the world of skilled trade. The paper does not intend to explore the types of skills which are taught to England offenders, but rather, to investigate the extent to which the learning of mathematics procedural fluency aids offenders in their skills development programs because it [mathematical procedural fluency] is a pre-requisite and a stairwell towards the learning of skills in correctional centres.

²² Gabrielle Wills and Joel Gondwe, “Investigating Grade 9 Mathematics Achievement in the Western Cape and Gauteng: An Analysis of TIMSS 2019,” Available at SSRN 3711426, 2022.

²³ J. Annison, J. Brayford, and J. Deering, “Transforming Rehabilitation: Implications for Women,” in *Women and Criminal Justice* (Policy Press, 2015), 21–38; Mark Ellison et al., “A Rapid Evidence Assessment of the Effectiveness of Prison Education in Reducing Recidivism and Increasing Employment,” *Probation Journal* 64, no. 2 (2017): 108–28; Ministry of Justice, *Transforming Rehabilitation: A Revolution in the Way We Manage Offenders*, vol. 8517 (The Stationery Office, 2013).

²⁴ Caroline O’Keefe, Paul Senior, and Valerie Monti-Holland, “Barriers to Employment, Training and Education in Prison and beyond: A Peer-Led Solution,” in *What Works with Women Offenders* (Willan, 2013), 240–61.

Although there is limited scholarship on England offenders' skills level, there is data on offenders' mathematics and procedural fluency performance.²⁵ Even though the data was not explicit on the specific aspects of mathematics procedural fluency that was assessed to the sample of offenders, it collectively outlined the slight right-skewed distribution of scores, with the highest value of 75%, lowest value of 10% and the interquartile range of 57. With the modal score of 63%, the data indicates that even though there were more scores on the left side of the box and whisker diagram, offenders' performance was on average. This kind of data can be used to assume that mathematical skills are used in skills development programmes, if the following statement is used as the hypothesis.

The number of offenders enrolled for, and performing better in mathematics is directly proportional to the number of offenders enrolled for skills development programs.

The findings of the quantitative study conducted by Creese (2014), which sought to analyse the performance of England male offenders in mathematics and literacy co-ordinate with the information from the scholarly work, at the point that the basic skills levels of literacy and numeracy are, in general, substandard. The claims around the poor numeracy skills of offenders, however, insufficiently address the questions of:

- What aspect(s) of numeracy, in particular, seem(s) to be influencing the overall poor performance in numeracy?
- Is the claim around numeracy poor performance founded on the fact that England male offenders fail to benchmark with fellow offenders from other countries?
- Does the congruency in numeracy and literacy performance suggest that language (literacy) and numeracy are in a direct proportionality relationship?

While the aforementioned questions might appear to be bedevilling, the performance of England offenders in mathematics, as presented in Jovanić's analysis of the Adult Literacy Survey can be instrumental in addressing them (the aforementioned questions), in one way or the other. There is an indication that offenders' numeracy education was not pitched at the correct level because of the lack of reliable information about offenders' "background mathematics educational levels", and the impact thereof on their performance in mathematics and numeracy.²⁶ For example, the study indicates that only 48% of offenders had a reading level above that of Educational Level 3. Nonetheless, after the intervention, about 82% of offenders had reading and writing levels equivalent to and above Educational Level 3. On the other hand, the study, only indicated that 65% of offenders had a numeracy level equivalent to and above Educational Level 3. Evidently, there is an indication of offenders' reading and writing background, and yet no evidence of pre-formal education mathematics level. These figures are therefore misleading, however, they can, at least, be used to highlight the state of mathematics and numeracy levels in England correctional facilities.

The researcher further reviewed the figures from the International Adult Literacy Survey and England Prison Population Survey to indicate the juxtaposition (according to large-scale studies) between England offenders and the general population as far as numeracy or mathematical performance is concerned. These figures were also presented as research findings in the study which was conducted by Creese with the objective of exhibiting the correlation between offenders' numeracy level and the general population's literacy and numeracy skills.²⁷ With the issues of gender, pre-incarceration educational background, socio-economic factors, and nature(s) of offenses being controlled, these findings outline the state of European offenders' mathematics performance (see Table 2 below).

²⁵ Brian Creese, "An Assessment of the English and Maths Skills Levels of Prisoners in England.," *London Review of Education* 14, no. 3 (2016): 13–30.

²⁶ Jovanić, Goran. "The Role of Education in the Treatment of Offenders." *Support for learning* 26, no. 2 (2011): 79-82.

²⁷ Creese, "An Assessment of the English and Maths Skills Levels of Prisoners in England."

Table 1: The state of prison English literacy again the general population literacy

English/literacy					
Levels	EL1 & below (%)	EL2 (%)	EL3 (%)	L1 (%)	L2 & above (%)
All prisons	7	13	30	36	14
SfL 2011	5	2	8	29	57

Table 1 indicates that 86% of the general population had literacy skills at level 1 and above [29%+57%=86%]. In prisons, 50% of offenders had literacy skills at level 1 and above [36%+14%=50%]. This indicates that language (or literacy) levels in prisons are 36% lower than in the general population. study on moderation and partial correlation analysis of the association between mathematics and language revealed that the development of language and mathematics skills was associated with stronger direct proportionality relations between language and mathematics. Furthermore, revealed that working memory, skills application, conceptual understanding, and factual knowledge of mathematics together explained over 50% of the variance in the relation between language and mathematics. Because of the evident interrelation between language (literacy) and mathematics, the researcher deemed it imperative to review the literature on both offenders' literacy performance (as indicated in Table 1 above) and offenders' mathematics performance (as indicated in Table 2 below). As a matter of fact, the paper sought to investigate how the translanguaging strategy (as the controlled variable) informs offenders' mathematics procedural fluency (the dependent variable).

Table 2: The state of prison English literacy again the general population literacy

Maths/numeracy					
Levels	EL1 and below (%)	EL2 (%)	EL3 (%)	L1 (%)	L2 and above (%)
All prisons	6	15	37	34	9
SfL 2011	7	17	25	29	22

The analysis of England offenders' numeracy competency provides a different pattern from literacy competency.²⁸ While the offenders' lower numeracy skills competency levels are more or less similar to the general population's numeracy skills levels, 12% more offenders have numeracy skills level at Education Level 3 [37%-25%], and 5% more offenders have numeracy skills at the Education level 1 [34-29=5%]. With the range of 31 [37-6=31], the difference between the cluster of lower numeracy skills levels and the cluster of higher skills levels (those at education level 3) is significantly higher. Nonetheless, the majority of offenders in England, according to the study had the numeracy level at Education level three (37%). While these figures only indicate the descriptive, non-nominal, discrete data which can be visually analysed through the box and whisker diagram, it can be concluded that the state of England offenders in mathematics performance is average.

The Conceptualization of Translanguaging

In recent years, scholars have shown various conceptualizations of translanguaging. Some scholarly works discuss and interpret translanguaging in the context of decolonization and multilingualism.²⁹ Furthermore, and discuss translanguaging in the context of mathematics education within bilingual classroom situations, while Leung and Valdes conceptualize translanguaging as the strategy employed by bilingual speakers both in the formal (classroom) and in the informal (out-of-classroom discourses) setting.³⁰ Considering the aforementioned conceptualizations, the translanguaging strategy can be comprehended by drawing on

²⁸ Creese, Gillian Laura. *The New African Diaspora in Vancouver: Migration, Exclusion, and Belonging*. University of Toronto Press, 2011.

²⁹ Ofelia García, *Bilingual Education in the 21st Century: A Global Perspective* (New Jersey: John Wiley & Sons, 2009); Ofelia García and Naomi Kano, "Translanguaging as Process and Pedagogy: Developing the English Writing of Japanese Students in the US," *The Multilingual Turn in Languages Education: Opportunities and Challenges*, 2014, 258–77; Li Wei, "Translanguaging as a Practical Theory of Language," *Applied Linguistics* 39, no. 1 (2018): 9–30.

³⁰ Constant Leung and Guadalupe Valdés, "Translanguaging and the Transdisciplinary Framework for Language Teaching and Learning in a Multilingual World," *The Modern Language Journal* 103, no. 2 (2019): 348–70.

two very different types of research and epistemologies, namely: The Fixed language approach, and the Fluid languaging approach.³¹

Even though the strategy of translanguaging is considered a dynamic and “transmutable” phenomenon that captures the complex practices of multilingual speakers, the researcher aims to review the scholarly literature based on the conceptualization of translanguaging within the context of the two aforementioned approaches.³² These two approaches will be integrated with the selected theoretical ideas of Andragogy to construct the conceptual lens (which will be discussed at a later stage) upon which the study is underpinned.

While other scholars purposively decide to engage in a difference between translanguaging and other related concepts (such as socio-linguistics repertoire, codeswitching, metrolingualism, polylingualism, multilinguaging and translingual practices), the researcher assembled, upon the two approaches, the solitary conceptualization of translanguaging to outline its idiosyncratic nature, particularly in relation to codeswitching [because the two practices are used interchangeably in some scholarly literature].³³

Fixed Language Approach

According to Poza, the fixed language approach towards conceptualizing translanguaging considers two or more languages as distinct and separate entities, which are used systematically in bilingual classrooms.³⁴ On the other hand, the fixed language approach to translanguaging is defined as the planned use of two languages through either a teacher-directed practice or a pupil-directed practice.³⁵ In the teacher-directed practice, translanguaging is planned by the teacher, and in the pupil-directed practice, translanguaging is planned by pupils. From either of the latter practices, one definition of the fixed language approach can be drawn, and that is, it is the prearranged use of two languages which is only fixed within the classroom context to maximise students’ linguistic and cognitive capability.

Fluid Languaging Approach

The fluid languaging approach towards translanguaging is conceptualized as the bilingual speakers’ unplanned use of two languages in the bilingual educational context.³⁶ Furthermore, the phrase “generalized translanguaging approach” is used to refer to the fluid languaging approach because it is a “generalized” use of two languages, from school to street, from pedagogical to everyday cognitive processing, from classroom to all contexts of a bilingual life.³⁷

While the two approaches are operationalized as separate subsets of translanguaging, this study conceptualizes both (approaches) as important in cognitive development, bilingualism, and decolonization of the curriculum primarily because both approaches congregate to bring forward the definition of translanguaging posited by.³⁸

Translanguaging as a Decolonial Strategy

The literature that was reviewed above focuses on translanguaging as the strategy at conceptual levels. While the conceptual understanding of translanguaging is paramount, the integrative review of studies

³¹ Leung and Valdés, “Translanguaging and the Transdisciplinary Framework for Language Teaching and Learning in a Multilingual World”; Bryn Jones, “Translanguaging in Bilingual Schools in Wales,” *Journal of Language, Identity & Education* 16, no. 4 (2017): 199–215; García and Kano, “Translanguaging as Process and Pedagogy: Developing the English Writing of Japanese Students in the US”; Gwyn Lewis, Bryn Jones, and Colin Baker, “Translanguaging: Origins and Development from School to Street and Beyond,” *Educational Research and Evaluation* 18, no. 7 (October 2012): 641–54, <https://doi.org/10.1080/13803611.2012.718488>.

³² Leung and Valdés, “Translanguaging and the Transdisciplinary Framework for Language Teaching and Learning in a Multilingual World.”

³³ Gort, Mileidis, and Ryan W Pontier. “Exploring Bilingual Pedagogies in Dual Language Preschool Classrooms.” *Language and Education* 27, no. 3 (2013): 223-45.

³⁴ Luis Poza, “Translanguaging: Definitions, Implications, and Further Needs in Burgeoning Inquiry,” *Berkeley Review of Education* 6, no. 2 (2017).

³⁵ Will Baker, “English as a Lingua Franca, Translanguaging, and EMI in Asian Higher Education: Implications for Pedagogy,” *English-Medium Instruction Translanguaging Practices in Asia: Theories, Frameworks and Implementation in Higher Education*, 2021, 21–38.

³⁶ García and Kano, “Translanguaging as Process and Pedagogy: Developing the English Writing of Japanese Students in the US.”

³⁷ Lewis, Jones, and Baker, “Translanguaging: Origins and Development from School to Street and Beyond.”

³⁸ Williams, Dylan G. “Trust and Translanguaging in English-Medium Instruction.” *ELT Journal* 77, no. 1 (2023): 23-32.

with an intention to explore the intersectionality and (or) “perpendicularity” between translanguaging and decoloniality is paramount, particularly because the present study sought to explore translanguaging through the prism of decoloniality.

Scholars such as Chaka and Odugu, explored the interrelatedness of translanguaging to decolonization, and discovered the direct proportion between the two, particularly if factors such as the use of English as the Language of Teaching and Learning (LoLT) are controlled.³⁹ However, the extent to which translanguaging is embedded in decoloniality in the context of correctional education remains unnoticeable in the scholarship. This contextual research weakness is worth noting because the studies on translanguaging being the embodiment of decolonisation are mainly based on children (Basic), and university (higher) education. The question of whether the interrelation between translanguaging and decolonization translates satisfactorily to the adult correctional education context is worth asking. Perhaps, the theorization of decolonization according to various scholarships, will aid in foregrounding its’ interlink to translanguaging in the context of correctional adult education.

According to Dei, decolonization involves resisting internalized colonial thoughts and practices and recognizing that the way we have come to know and understand the world is socially, politically, and culturally constructed.⁴⁰ The question, however, of “what decolonial thoughts and practices entail” remains indeterminately addressed, particularly in the context of language and mathematical pedagogy (around which the current study revolves). Conceivably, Pennycook’s theorization of decolonization as the process of “reversing” power relations can aid in situating Dei’s “decolonial thoughts and practices” within the context of mathematics pedagogy and language.⁴¹ In their subjective theorization of decolonization, Pennycook argues that decolonization is about changing power relations, it is about politics of knowledge for power subversion, and it is about challenging colonial thinking.⁴² Drawing from this epistemological view, it is safe to argue that decolonization, in the context of mathematics and language, is about guaranteeing the equilibrium in “language power relations “in the learning and (or) the teaching of mathematics. As a matter of fact, the discussion of decolonization as both practice and process, argues that decolonization displaces the privileged position that Western knowledge has historically occupied, and by subverting ontological, epistemological, and axiological hegemonies, it [decolonization] provides space for non-Western ways of knowing. The privileged position that Western knowledge has historically occupied entails, but is not limited to, the “Western” languages which traditionally occupied the position of being used as the Languages of Teaching and Learning. Unfortunately, the Adult Education Policy Framework of South Africa, up to the present time, stipulates that adults (including those in correctional facilities) ought to be taught mathematics solely through the medium of English. The findings of the present study (which will be discussed at a later stage) confirm that the integration of English with isiZulu (a non-Western language) advance mathematics procedural fluency and decolonise mathematics curriculum in correctional centre classrooms.

The claim that “translanguaging is the dynamic and the fluid practice of using linguistic resources to enable the different forms of meaning”⁴³ hypothesises the phenomenon under exploration in this study, however, the phrase “different forms of meanings”, in this context, encompasses mathematics procedural fluency.

In what can be understood as the integrative review between decolonization and translanguaging, an epistemological claim, which arguably intersects the two concepts (translanguaging and decolonization) is given as the dynamic flows of multilingual and multimodal interactions, which decolonizes the understanding of language and other aspects of education⁴⁴. In other words, through the practice of translanguaging, the languages and other aspects of education (mathematics, for instance) are

³⁹ Chaka Chaka, “Translanguaging, Decoloniality, and the Global South: An Integrative Review Study,” *Scrutiny* 25, no. 1 (2020): 6–42; Desmond Odugu, “Translanguaging as Decolonial Praxis: Pedagogic and Epistemic Thrusts in the Politics of Official Knowledge,” *Journal of Multilingual Theories & Practices* 3, no. 1 (2022).

⁴⁰ George J Sefa Dei, “Decolonizing Education for Inclusivity: Implications for Literacy Education,” *Transcultural Literacies: Re-Visioning Relationships in Teaching and Learning*, 2019, 5–30.

⁴¹ Alastair Pennycook, *The Cultural Politics of English as an International Language* (Routledge, 2017).

⁴² Pennycook, *The Cultural Politics of English as an International Language*.

⁴³ Doherty, Liam, Bonny Norton, and Espen Stranger-Johannessen. "10 Translation, Identity and Translanguaging." *Multilingualism and identity: Interdisciplinary perspectives* (2022): 201.

⁴⁴ Hornberger, Nancy H, and Holly Link. "Translanguaging in Today's Classrooms: A Bilingual Lens." *Theory into practice* 51, no. 4 (2012): 239-47.

understood and perceived from the non-colonial lens, because it [translanguaging], develops the critical awareness of the constructed hierarchization of languages and the colonial imperialistic histories that informed such hierarchization. If the hierarchization of languages is demolished, so will the power of “colonial languages” in the curriculum. Subsequently, the dismantling of “language hierarchization” will arguably result in the curriculum being centred around the context within which it is learnt. Garcia and Leiva’s argument reveals the relationship between translanguaging and decolonization, which can be comprehended through the formula as indicated below.⁴⁵

$$\text{Translanguaging } \propto \frac{1}{\text{colonised curriculum within mathematics classrooms}}$$

The formula above illustrates that the translanguaging strategy is in inverse proportion to the colonised curriculum and pedagogical practices in mathematics classrooms. The section on the findings of the study will reveal if the hypothesis illustrated in the formula above can be accepted or rejected. While the role of the translanguaging strategy in ascertaining the decolonization of the curriculum, particularly in mathematics classroom settings is evident, the scholarship that reveals whether the conceptualization of translanguaging as the decolonial strategy translates satisfactorily to adult correctional centre classrooms is limited. There is, however, literature on translanguaging practices in the context of “conventional” adult mathematics teaching and learning. The subsequent review seeks to discuss and reveal the gaps in the literature as far as translanguaging in the context of adult mathematics education is concerned.

Translanguaging in the Context of Adult Mathematics Education

The translanguaging strategy is the singular practice, which is comprehended and interpreted differently, by different scholars, in different contexts. In the adult education setting, for instance, translanguaging is referred to as the process where adult teachers and adult students take part in language practices that are open for students’ use of linguistic repertoires when developing a new language.⁴⁶ In other words, in adult education, translanguaging is not only conceptualized as the planned or social use of two languages in a bilingual context but it is also considered to be a “complex” practice of working with a variety of languages) with an intention to “create” or develop a new language, upon the basics of different repertoires.⁴⁷ There are limited integrative studies, however, on children’s and adults’ translanguaging practices, hence, the question of whether the translanguaging practice in children does not create the “new language”, made up of different repertoires as much as it does in adults is a legitimate question.

The six principles of andragogy, which are discussed in Knowles’ theoretical perspective of andragogy can be featured with Beiler and Dewilder’s conceptualization of translanguaging in adult education to model a unique perspective of what translanguaging practices denote in adult education.⁴⁸ For example, Knowles’s integration of experience and self-concept to generate a revolutionary idea of “helping” adults, which is parallel to that of “teaching” them, is the perfect example of the fact that “new language” developed through the translanguaging strategy in adult education settings could be used to “help” them [adults] to reach the advanced level of knowledge abstraction.⁴⁹ In other words, the afore scholarship can be used to conclude that in adult education, translanguaging is not used as the scaffold [as illustrated in the Social Development theoretical perspective] but as the resource for and towards helping adults [from the andragogic theoretical perspective] reach the advanced level of knowledge comprehension. While this distinction seems tenable, one commonality between how translanguaging (as a practice) differs for children and adults’ education is that, in both situations, it [translanguaging] is the

⁴⁵ Ofelia García and Camila Leiva, “Theorizing and Enacting Translanguaging for Social Justice,” *Heteroglossia as Practice and Pedagogy*, 2014, 199–216.

⁴⁶ García and Kano, “Translanguaging as Process and Pedagogy: Developing the English Writing of Japanese Students in the US.”

⁴⁷ Florence Bonacina-Pugh, Ildegrada da Costa Cabral, and Jing Huang, “Translanguaging in Education,” *Language Teaching* 54, no. 4 (2021): 439–71.

⁴⁸ Malcolm Shepherd Knowles, “Theory of Andragogy,” *A Critique. International Journal of Lifelong. Cambridge MA*, 1984; Ingrid Rodrick Beiler and Joke Dewilde, “Pedagogical Translanguaging in Adult Basic Education,” in *LESLLA Symposium Proceedings*, vol. 17, 2023, 5–21.

⁴⁹ Knowles, “Theory of Andragogy.”

support that can be removed when both adults and children are more advanced and competent in the language(s) in question.⁵⁰

For Garcia, Garcia, and Leiva and Li, translanguaging pedagogy constitutes a set of transformative practices [which include an ambition for social justice and equality] in which adult students engage.⁵¹ It is important to note the three studies from which the latter claim was inferred were centred around the critical epistemological stance. While issues of justice and equality in the context of language practice are paramount, it is equally paramount to interpret the situations based on the context. For this reason, the present study seeks to explore the translanguaging practice in the context of mathematics education within correctional centre classrooms. As a matter of fact, the scholarship that integrates adult learning, mathematics learning (and teaching) in correctional centre classrooms and the translanguaging strategy is hitherto limited.

THEORETICAL UNDERPINNINGS

The researcher constructed the conceptual framework by integrating Bonacina-Pugh et al. conceptualization of translanguaging within the fixed language approach and fluid languaging approach with the Andragogic theoretical idea of helping adults to learn.⁵² Figure 6 below diagrammatically illustrates how the conceptual framework which underpins the study was constructed.

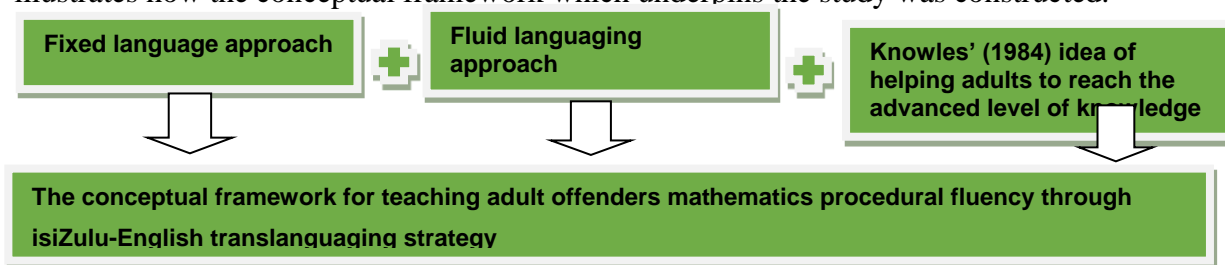


Figure 6: Diagrammatic synthesis of the conceptual framework upon which the study is underpinned

The rationale behind constructing the conceptual framework by integrating the concepts and the theoretical ideas emanates from Imenda's work which intended to distinguish between the conceptual framework and the theoretical framework.⁵³ Imenda (2014) posits that if the research problem cannot be meaningfully researched in reference to one theory or concept, the researcher may have to "synthesize" the existing views in the literature concerning a given situation, with the selected ideas from the particular theory to create the conceptual framework, which essentially represents an integrated way of looking into the problem.⁵⁴ The fluid languaging approach and the fixed language approach were discussed in the literature, however, in this section, the researcher will explain how the two approaches and the Andragogic idea of "helping" adults to learn can be integrated and be used as the conceptual lens.

The use of translanguaging inside the walls of the correctional center classroom (fixed language approach) emanates from and is informed by the use of translanguaging outside of the walls of the correctional centre classroom. alludes that the fixed language approach and the fluid languaging approach overlap and co-exist. Assembling from this epistemological claim, it is beyond a shadow of a doubt that the fixed language approach and fluid languaging approach (even though they are grounded in a different epistemology and hence provide a different understanding of translanguaging) reciprocally inform classroom learning and daily conversations outside of the classroom walls.

In the context of correctional centre education, the two approaches are coordinated by the fact that adult offenders are multilingual, and hence they combine different languages to create a "new language", which can be used for learning and discourse purposes. Drawing from this epistemological view, the "new language" can be used by the teacher, as the scaffold to help them [adult offenders] understand and

⁵⁰ Lewis, Jones, and Baker, "Translanguaging: Origins and Development from School to Street and Beyond."

⁵¹ García, *Bilingual Education in the 21st Century: A Global Perspective*; García and Leiva, "Theorizing and Enacting Translanguaging for Social Justice"; Wei, "Translanguaging as a Practical Theory of Language."

⁵² Bonacina-Pugh, da Costa Cabral, and Huang, "Translanguaging in Education."

⁵³ Sitwala Imenda, "Is There a Conceptual Difference between Theoretical and Conceptual Frameworks?," *Journal of Social Sciences* 38, no. 2 (2014): 185–95.

⁵⁴ Imenda, "Is There a Conceptual Difference between Theoretical and Conceptual Frameworks?"

perform mathematics procedures. The integration of these views arguably yields the conceptual lens through which mathematics procedural fluency can be understood, interpreted, and analysed (see the diagram in Figure 7 below).

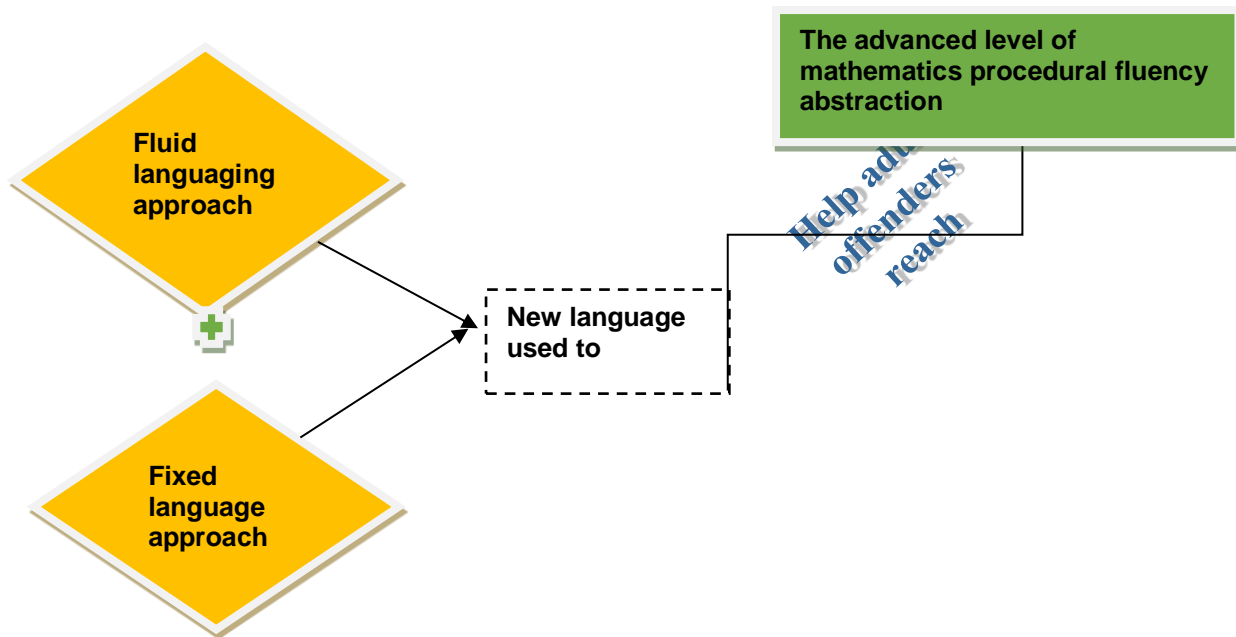


Figure 7: The diagrammatic representation of the conceptual framework which underpins the study

METHODOLOGY

The study was designed to explore, through qualitative and quantitative data, the use of the translanguaging strategy as the means of decolonizing and advancing the teaching of mathematics procedural fluency. Fifty adult offenders from one correctional centre in the province of KwaZulu-Natal were purposively sampled to participate in the study, and the researcher used the translanguaging strategy as an intervention for developing mathematics procedural fluency and decolonising the mathematics curriculum. The adult offenders were sampled from the Adult Education and Training level two group, and presumably, all the participants had passed AET level one, hence, the mathematics procedural fluency was taught at the AET level two pace.

Data was collected from pre-tests, post-tests, and semi-structured interviews with adult offenders. It (data) was analysed through SPSS, transcribed, carefully sifted, and thematically analysed to address the questions:

- How does the use of translanguaging strategy influence the procedural fluency of mathematics in adult correctional centre classrooms?
- How can the decolonization of mathematics curriculum be attributed to the use of translanguaging in correctional centre classrooms?

SPSS automatically analysed pre-test and post-test scores, while the qualitative data was initially coded to observe patterns, and it [qualitative data] was thereafter, arranged according to different themes. The researcher used the qualitative data to explain and attach meaning to the quantitative data.

PRESENTATION OF FINDINGS

Quantitative Results

Test of Normality

According to Oztuna et al., when normality assumptions do not hold, it is impossible to draw accurate and reliable conclusions about the reality of data.⁵⁵ In this study, the Shapiro-Wilk test was done to determine

⁵⁵ Derya Öztuna, Atilla Halil Elhan, and Ersöz Tüccar, "Investigation of Four Different Normality Tests in Terms of Type 1 Error Rate and Power under Different Distributions," *Turkish Journal of Medical Sciences* 36, no. 3 (2006): 171–76.

whether the data were normally distributed or not. Furthermore, the Shapiro-Wilk test was done to determine whether the comparison should be done using a parametric or non-parametric test.

For the Shapiro-Wilk test, the determinant of data normality is the alpha value being greater than .05 ($p > .05$). The null hypothesis (H_0) was that the pre-test scores were normally distributed. The p -value in the normality table below was used to determine the normality of the data and to determine whether the null hypothesis should be accepted or rejected.

Table 3 : The case processing summary

	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Pretest	50	100,0%	0	0,0%	50	100,0%
Post-test	50	100,0%	0	0,0%	50	100,0%

Table 4 : The tests of normality table

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Pretest	,100	50	,200*	,977	50	,442
Post-test	,117	50	,085	,965	50	,143

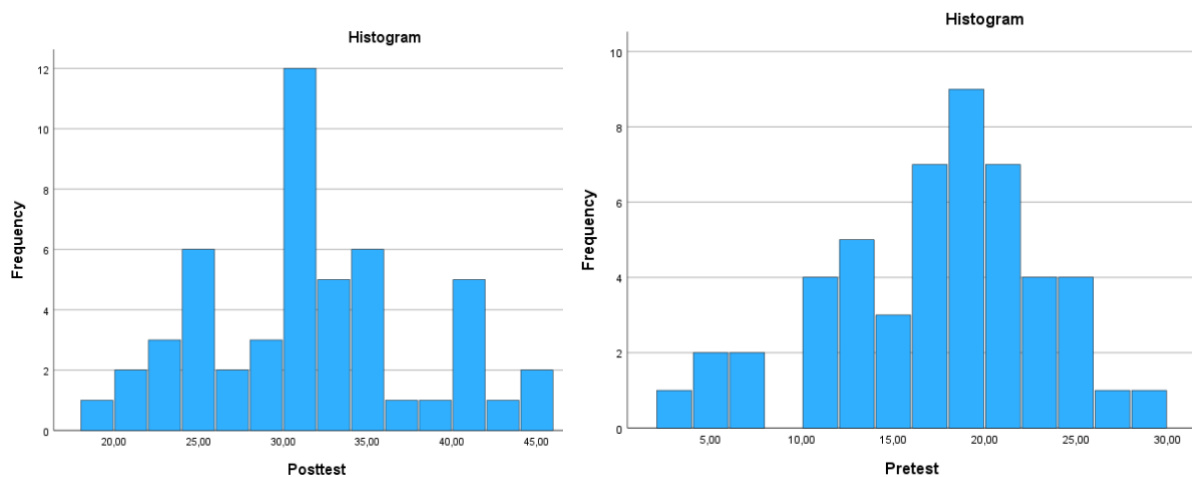


Figure 8: The frequency-test histograms

According to the tests of normality table, for both pre-test and post-test mathematics scores, there were no statistically significant values between the scores and normality, in other words, the data were normally distributed (for the pre-test, the p -value is 0.442, which is greater than 0.05; and for the post-test, the p -value is 0.143, which is greater than 0.05). Again, the frequency histograms for both pre-test and post-test scores are bell-shaped, which denotes the normal distribution of data.

Paired Sample T-Test Which Was Run For Mathematics Pre-Test And Post-Test

The hypothesis for the paired sample t-test was as follows:

The null hypothesis: The difference between the paired sample means is equal to zero (that is, the intervention on the use of translanguaging was not effective at all because the pre-test and the post-test score means are the same).

The alternative hypothesis: The difference between the paired sample means is NOT equal to zero (that is, the intervention was effective because the pre-test score mean differs significantly from the post-test score mean).

The following paired samples test was used to observe if the intervention of the use of translanguaging had a significant impact on adult offenders' mathematics performance.

Table 5 : The paired samples test

		Paired Differences					T	D f	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One- Side d p	Two- Sided p
					Lower	Upper				
Pair 1	Pretest – Post-test	-14,06000	4,2398	,599 6	- 15,264 94	- 12,855 06	- 23,4 49	49	<.00 1	<.001

According to the paired samples Table 5, the difference between the pre-test and post-test mean is negative, which implies that the post-test scores were higher than the pre-test scores. To find out if this mean difference is statistically significant, the t -value has to be greater than the critical value of 2,045. From this intervention, the t -value is 23,449 (a negative sign denotes that the pre-test mean score was lower than the post-test mean score), which is much greater than the critical value of 2,045. $23,449 > 2,045$.

Furthermore, the lower and the upper 95% Confidence interval of the difference have values which have negative signs. This means the mean difference of -14,06000 (between the pre-test and post-test score mean scores) is statistically significant.

Qualitative Findings and Discussion

The following themes emerged from the analysis of the semi-structured interviews with the purposively sampled group of fifteen adult offenders.

Translanguaging as the resource for developing isiZulu-English vocabulary and mathematics register

Adult offenders indicated that the use of translanguaging as the strategy for teaching mathematics procedural fluency aided them in two-fold ways. Firstly, translanguaging developed their isiZulu and English vocabulary. In other words, since the participants were predominantly isiZulu home language speakers, they got to translate the majority of isiZulu concepts into English, and subsequently develop both English and isiZulu vocabulary concurrently. Secondly, the translanguaging strategy aided them to better understand mathematics procedural fluency, which is presented in the medium of English. In other words, combining the two dialects (isiZulu and English) served as the scaffold which transmuted adult offenders to the advanced level of mathematics procedural fluency. The responses from two adult offenders (adult offender A and adult offender B) are illustrated verbatim below.

Adult offender A

Ngingathi kuyasiza ukuthi sifundiswe ngokushintshanisa ulimi lwesiNgesi nesiZulu. Mina bengingawazi umehluko phakathi kokuhlanganisa ngamaqoqo nokuhlanganisa isebenzise ikholomu. Sengiyazi manje ukuthi uma uhlanganisa ngamaqoqo, ihlukanisa inumber ngamaqoqo, bese ukuhlanganisa konke ekugcineni. Okunye, bengingazi ukuthi ukuhlanganisa nokuphindaphinda kusho izinto ezimbili ezingafani. NgesiNgesi, ukuhlanganisa i-addition, bese ukuphindaphinda i-multiplication. Nolwazi lwami lolimi lwesiNgesi olusetshenziswa uma kublazwa seluthe ukukhula.

Translation in English

I would say it helps to be taught through translanguaging. For instance, I did not know the difference between adding through grouping and adding using the column method. Now I know that adding through grouping implies that a number has to be separated into groups, according to different place values. All those groups are to be added at the end. Again, I did not quite understand the difference between addition

and multiplication. To me, these English concepts meant one and the same thing. Now I understand that they are in fact different. For instance, addition denotes adding something on top of the other, whereas multiplication denotes repeating a number a couple of times. Even my mathematics register has increased significantly through translanguaging.

Adult offender A indicated that both his mathematics procedural fluency of addition and subtraction and his isiZulu/English vocabulary improved because of translanguaging. The conceptual lens can be used to comprehend his response because the new language (coined by the transmission between isiZulu and English) served as the scaffold that helped him to better understand both isiZulu/English and the procedural fluency of addition and subtraction. While offender A only referred to translanguaging in the context of the mathematics classroom (fixed language approach), adult offender B indicated that, in fact, using translanguaging inside the classroom context and using it outside of the classroom context is, in fact, both instrumental in the development of isiZulu/English vocabulary and mathematics procedural fluency.

Adult offender B

Ngokwami, vele ukushintsha isiZulu ngesiNgisi yinto esiyijwayele. Noma sizixoxela emaselini siyaxuba vele. Kodwa kusizile ukuthi leyo ndlela yokuxuba siyisebenzise nasesikoleni. Uthisha ubesebenzisa isiZulu nesiNgisi ukusizisa ukuthi sizazi zombili lezi zilimi. Futhi, ngingathi ukushintsha isiZulu nesiNgisi kusizile ngoba sengiyazi ukuthi singawusebenzisa kanjani ulayini nokuqonda ubungako benamba uma sihlanganisa. Kahle kahle, lolu limi esilukhuluma ngaphande nesilukhuluma lana ekilasini into efanayo, futhi kungcono kunokufunda ngesiNgisi kuphela.

Translation in English

In my view, isiZulu-English translanguaging is actually the way of speaking which we are accustomed to. Even in our conversations in the holding cells, we transition between the two languages. But in my view, using translanguaging in the classroom context helped a lot. The teacher's use of isiZulu and English in the mathematics classroom context helped us to understand the two languages, because we do not know/understand isiZulu that much. Furthermore, I now understand that the number line can be used to perform addition, which I did not know. In fact, the "new language" which we speak outside of the classroom is the same as that which we use to learn mathematics. In my view, being taught mathematics through translanguaging is a lot better than being taught solely in English.

Adult offender B's indication confirms what was discussed in the literature review that, both the fixed language approach and fluid languaging approach are important, and have a single point of convergence, that is, they provide scaffolding and enable the dynamic flows of multilingual and multimodal interactions.⁵⁶ Again, the statistical significance of the difference in means between the mathematics pre-test and mathematics post-test indicates that, through translanguaging, adult offenders were helped to understand mathematics procedural fluency and be scaffolded to the advanced abstraction of mathematics because their performance in the post-test (wherein translanguaging was used) was significantly greater than their performance in the pre-test (wherein translanguaging was not used).

Translanguaging as the strategy for decolonizing the mathematics curriculum in the correctional centre classroom

The participants indicated that the use of the translanguaging strategy in the teaching of mathematics procedural fluency aided them in understanding mathematics procedural fluency as the procedure pertinent for solving their immediate problems. Again, they indicated that through isiZulu/English translanguaging, they got to understand that mathematics is not western, but it is part of their conventional day-to-day lives. **Adult offenders C, D and E** elucidated on this as follows:

⁵⁶ Lewis, Jones, and Baker, "Translanguaging: Origins and Development from School to Street and Beyond."

Adult offender C

Ukufakwa nje kwesiZulu ezibalweni, nokusetshenziswa kwezibonelo esizaziyo kwenze ngabona ukuthi kahle kahle, izibalo ziyimpilo yethu nje, futhi singazisebenzisa ukuxazulula noma iluphi uhlobo lwenkinga esihlangabezana nayo.

Translation in English

The mere use of isiZulu in the teaching of mathematics procedural fluency made me realise that, in fact, mathematics is part of our lives, and it [mathematics] can be used to solve whatever problem we come across.

Adult offender D

Besihlezi sazi ukuthi isiNgisi isona esingcono, futhi okungafundwa ngaso izibalo. Ngithe uma sengifundiswa izibalo ngolimi lwesiNgisi nolwesiZulu, ngabona ukuthi asingcono, okusempeleni, ngenze kahle kakhulu ezibalweni ngesikhathi sezifundiswa ngolimi lwesiNgisi nesiZulu.

Translation in English

We have always thought English is a better language through which mathematics can be understood. However, when I got to learn mathematics in English and in isiZulu, I realized that English is not a superior language. In fact, I did very well in mathematics since it was taught through the two mediums, isiZulu and English.

Adult offender E

Isingisi nesiZulu kuyafana futhi kuyalingana. Lokho ngikubone ngokuthi zombili lezi zilimi ziyakwazi ukusisiza ukuthi sazi ukuthi izibalo zenziwa kanjani, futhi zisiza ngokufanayo.

Translation in English

English and isiZulu are equal. I got to realise that when both of these languages helped us to perform mathematics procedural fluency.

The three adult offenders, though not ostensibly, indicate that translanguaging is the decolonial strategy that changes and challenges language power relations in the mathematics classroom context and demolishes the western constructed hierarchy of languages, on top of which are languages deemed less eligible to transmute knowledge.⁵⁷ It was also through the translanguaging strategy that adult offenders were conscientious of the hierarchization of languages and the colonial and imperialistic histories of such hierarchizations.⁵⁸ According to the three adult offenders, translanguaging in the context of the correctional centre classroom disrupted the boundaries between the languages of “power” and “subordinated languages”.⁵⁹

Conceptualization of translanguaging as a catalyst for mathematics procedural fluency improvement in adult correctional centre classrooms

The studies reviewed above indicate that South African children fail to benchmark with their counterparts from other countries. Furthermore, the researcher revealed that there is limited scholarship on mathematics performance in correctional centre classrooms. The findings of the present study filled in the gap by exhibiting one among various strategies which can be used to improve mathematics in correctional centre classrooms, and that is the translanguaging strategy. Looking into the performance of adult offenders prior and after the use of the translanguaging strategy, the quantitative analysis revealed that after the use of translanguaging, the performance of adult offenders in the post-test was significantly improved, with the t-value of 6,004 indicating a significant advance in mathematics performance after the intervention.

⁵⁷ Finex Ndhlovu and Leketi Makalela, *Decolonising Multilingualism in Africa: Recentring Silenced Voices from the Global South*, vol. 26 (Multilingual Matters, 2021); García and Leiva, “Theorizing and Enacting Translanguaging for Social Justice.”

⁵⁸ García and Leiva, “Theorizing and Enacting Translanguaging for Social Justice.”

⁵⁹ Ofelia García, “Translanguaging: A Coda to the Code?,” *Classroom Discourse* 10, no. 3–4 (October 2, 2019): 369–73, <https://doi.org/10.1080/19463014.2019.1638277>.

Furthermore, the fact that the lowest score in the pre-test was three out of fifty, whereas the lowest score in the post-test was twenty out of fifty, makes it safe to assume that exclusive of the translanguaging intervention, the performance of adult offenders in mathematics is substandard. Even though some other factors can contribute to this substandard performance, language issues are predominantly controlling factors for adult offenders' mathematics performance. The researcher argues, in this regard, that translanguaging can be used as one of the strategies for helping adults perform better and reach the advanced level of procedural fluency understanding. Drawing from the andragogic epistemologies, language is the scaffold that helps adult offenders reach an advanced level of mathematics understanding.

The view of offender rehabilitation from the prism of the translanguaging strategy

The study discovered that there is not a direct and noticeable relationship between the rehabilitation of offenders and the use of the translanguaging strategy in the correctional centre classroom. The entire rehabilitation process does not feature the use of the translanguaging strategy (at least, not apparently). As a matter of fact, using translanguaging as the strategy for the teaching and learning of mathematics procedural fluency aids only in progressing adult offenders to the advanced levels of Adult Education and Training (this can be confirmed by the fact that the performance of adult offenders in the post-test was significantly higher, hence the strategy makes them qualify for admission into the subsequent, advanced AET levels-if they met the pass requirements on the other learning areas). However, there is no evidence of the use of the translanguaging strategy in the advanced AET levels. Henceforth, it is difficult to establish whether translanguaging (in the advanced AET levels) is resourceful in the Skills Development Programs, which are the significant subsets of the rehabilitation process.

RECOMMENDATIONS

The translanguaging strategy is recommended for use in the teaching of mathematics procedural fluency in correctional centre classrooms. As a matter of fact, the researcher recommends not only the fluidity in the use of isiZulu and English, but also the fluidity of and between any repertoires as far as the teaching of mathematics procedural fluency to adult offenders in a correctional centre classroom is concerned. Furthermore, the researcher recommends a strategy for both children's and adults' mathematics education.

CONCLUSION

The findings from this paper revealed that the translanguaging strategy improves adult offenders' performance and understanding of mathematics procedural fluency in the correctional centre classroom. Furthermore, the paper found that the decolonization of the mathematics curriculum is realizable through (amongst other factors) the use of the isiZulu-English translanguaging strategy. Nonetheless, there is no evidence of a correlation between offender rehabilitation and the use of the translanguaging strategy. Because the study was only contextualised within the AET level two, the researcher deems it paramount to conduct the study in the advanced AET levels so that the role of translanguaging in Correctional Centre Skills Development Programs may be assumed. Moreover, the use of translanguaging across all the learning areas may be appropriate in assuming whether translanguaging can be used across the curriculum.

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