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The Contemporary Andragogical Framework: The Impact of Translingual Practices on the Development of South African Offenders' Metalinguistic Awareness and Mathematics Understanding

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Abstract. This paper explored the impact of translingual pedagogical practices on the synchronic development of metalinguistic awareness and mathematics conceptual understanding in an adult correctional centre classroom in South Africa. I reported on the functioning of translingual andragogical practices in the selected South African multilingual mathematics learning environment in. The epistemologies of the paradigm of pragmatism were employed. Through a mixed methods research approach, I collected quantitative data from 250 randomly sampled adult offenders through pre-testing and post-testing. Qualitative data were collected from 20 purposively sampled mathematics educationists. I used the latter methodological lens to collect and analyse data, which sought to address the research question: How do translanguaging approaches affect adult offenders' metalinguistic awareness and mathematics conceptual understanding compared to traditional monolingual approaches? Findings were inferred from the analysis of data thematically and by SPSS, through the Andragogic theoretical perspectives. The findings identified the fundamental role of translingual predicated practices in the development of adult offenders' multilingual competencies. The findings further underscored the position of translingual andragogical practices in the concurrent development of adult offenders' mathematics conceptual understanding and metalinguistic awareness. This study contributes to the growing field of multilingual andragogy by demonstrating how translanguaging can be systematically integrated into mathematics learning environments to foster mathematics understanding and metalinguistic awareness. The andragogical framework presented offers guidance for educationists seeking to implement translanguaging approaches in correctional centre mathematics classrooms, while accommodating adult offenders' learning preferences.

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1. Introduction

Multilingualism, migration and the dynamicity of learners' demographics have resulted to a significant transformation in the linguistic landscape of both adults' and children's education. Because language and mathematics are conceptually inseparable (Peng et al., 2020), the logical preposition to make is that the transformation in the linguistic landscape informs mathematics learning and andragogical practices. In fact, by predicating upon Ruiz's (1984) three orientations to language planning, Ryan and Parra (2019) document the epistemological dimension of multilingualism in mathematics education, thereby arguing for the role of language multiplicity in optimising the processes of teaching and learning of mathematics (also see Morgan et al., 2014).

In an endeavour to further demonstrate the intricate relationship between the transformation of the linguistic landscape and the learning and teaching of mathematics, I drew from Pimm and Keynes' (1994) argument that the teaching and learning of mathematics involves the activities of reading, writing, listening and discussing, (which rely on language). The critical implications of multilingualism on mathematics education research have, over the past few decades, been documented by several scholars (Bairy, 2019; Parra & Trinick, 2018; Phakeng, 2018). However, while there have been ubiquitous arguments on the role and the impact of multilingual pedagogies and andragogy in mathematics education, the contemporary postulation of translanguaging as the compelling pedagogical and andragogical framework within multilingual mathematics classrooms (Conteh, 2018a, 2018b, 2018c) is arguably legitimate, particularly given its alignment with the fluid language practices of present-day learners.

In an attempt to authenticate the scholarly view of translanguaging as the compelling andragogical framework, I endeavoured to investigate the confluence of offenders' translanguaging with mathematics understanding and metalinguistic awareness, focusing on the selected South African correctional centre classroom. In the orchestration of this scholarly endeavour, I conceptualised offenders' translanguaging as an educational practice of using adult offenders' linguistic competencies and abilities to help them learn academic content in a correctional centre classroom.

While translanguaging research has expanded exponentially over the past decades (Vogel & Garcia, 2017; Conteh, 2018c; Wei, 2018; Fuster & Bardel, 2024), investigations of how translanguaging andragogy function within adult correctional education environments and how they align with the learning preferences and linguistic practices of adult offenders remain relatively minimal. This research gap is significant, given the accelerated shift from the punishment approach to the humanistic approach to offender rehabilitation (Umbreit & Hansen, 2017), which is achievable through (but not solely from) correctional education. Furthermore, intertwinement of language with mathematics (Erath et al., 2021) and the significant role of offender quantitative literacy in the reduction

of recidivism (Walker & Davidson, 2018; Saberi et al., 2023) arguably calls for scholarly investigations on how and to what extent does translanguaging function within adult offender mathematics classrooms, particularly given the expansion of multilingualism in South African correctional centres.

1.1 Study Objectives

In this paper, I addressed the latterly mentioned research gap by examining the implementation, role and effectiveness of translingual andragogical practices within correctional centre classrooms for developing multilingual competence, metalinguistic awareness and mathematics conceptual understanding among learners who are adult offenders. As such, I aimed to investigate the impact of translanguaging approaches on adult offenders' metalinguistic awareness and mathematics conceptual understanding. I benchmarked translanguaging approaches against traditional monolingual approaches.

1.2 Questions of the Study

Specifically, the research investigated:

- How do translanguaging approaches affect adult offenders' metalinguistic awareness and mathematics conceptual understanding compared to traditional monolingual approaches?

1.3 Significance of Study

The significance of this research lies in its contribution to evolving andragogical practices that efficiently address the complex multilingual realities of adult offenders. Furthermore, the research contributes the andragogical framework to be used within the context of correctional education (which receives minimal scholarly attention, particularly within the South African context). By examining the intersection of translingual practices, mathematics learning environments and the linguistic preferences of contemporary adult offenders, this study predicates linguistically responsive andragogical approaches that prepare adult offenders for the world of skilled trade, after incarceration.

2. Literature Review

I arranged the review of literature, in this paper, as follows:

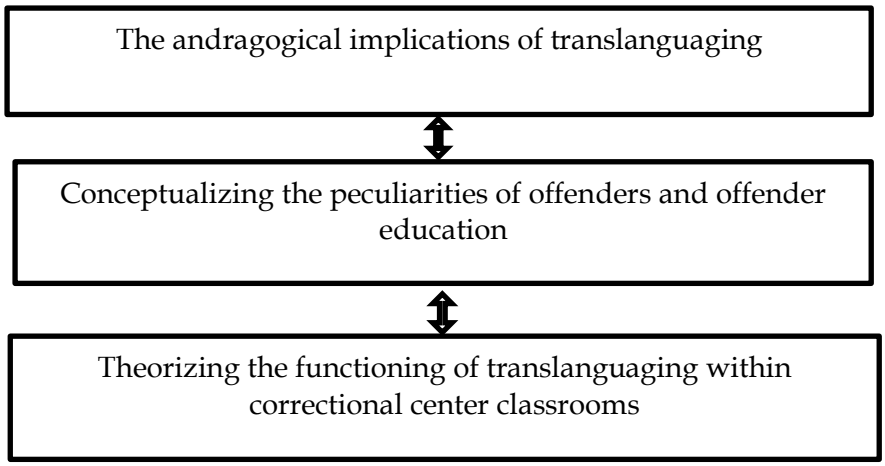


Figure 1: The outline of the literature review

2.1 The andragogical implications of translanguaging

Various scholarly works have used the heteroglossic perspective to model the theorization and the conceptualisation of translanguaging. For example, García and Leiva (2014) perceive translanguaging as the practice that stems from the heteroglossic perspective, which challenges monolingual ideologies and traditional conception of languages as bounded autonomous systems[†]. Paulsrud et al. (2017) amplify the scholarly conceptualisation of translanguaging practices as the direct opposite of monolingual practices by explaining it as the practice wherein the innumerable lexical features mastered by bilinguals and multilinguals occupy a cognitive terrain that is not fenced off into anything like the two areas suggested by the two socially named languages.

Although the foci of the latter definition were from the cognitive standpoint, it illustrates the understanding of translanguaging as the non-bound, fluid use of different languages within the social and educational context, for the purposes of communication and meaning making (Carroll & Mazak, 2017). In fact, for Otheguy et al. (2015), translanguaging practitioners perceive bilinguals and multilinguals as individuals possessing a unified linguistic repertoire from which they strategically select features based on communicative needs and for meaning making purposes.

The exponential expansion of multilingualism across various educational contexts, which hinted at the fact that multilingual learners require maximum exposure to the fluid use of languages (Pulinx, 2017), arguably accelerated the shift from the theoretical perception to the inquiry into the andragogical and pedagogical implications of translanguaging. Creese and Blackledge (2015), for example, demonstrated the pedagogical implications of translingual practices by coining two epistemes to translanguaging (i.e. Fixed language approach and fluid languaging approach). In their attempt to problematize monolingual pedagogical practices, Creese and Blackledge (2015) argue that translanguaging can be used as the pedagogy within and outside of classroom contexts. This endeavour towards situating translanguaging within the pedagogical context, in my view, coincides social and education-based language use, thereby modelling the plausibility of translingual practices within teaching-learning contexts.

In fact, the argument for the use of translanguaging as the pedagogical strategy has been discernible in the contemporary intellectual timeline, with many scholarly proposals considering the need to focus on multilingualism, thereby acknowledging that the boundaries between languages are reducible and that the reference to the monolingual pedagogical approach in linguistically diverse classrooms is problematic (Canagarajah & Liyanage, 2012; Gorter & Cenoz, 2014; Mbatha et al., 2025; Zondi & Mbatha, 2025). This "non-precipitous" shift from monolingual pedagogical approaches [which reiterated learners' competence solely in the language of learning and teaching, (Phakeng, 2018)], to translingual approaches, I argued, is traceable from the continuance of various scholarly

[†] The perception of language(s) as bounded autonomous systems refers to the observation of languages as separate entities, with boundaries limiting the unitarization of language(s) and language use (García & Kleyn 2016).

contestations about whether or not multilingualism is a resource. Although contemporary findings indicated that multilingual learners have learning and language competencies, this paper documented how and to what extent is translanguaging used to elicit those competencies, particularly within the context of mathematics classrooms.

I further sought to provide the andragogical framework for using translanguaging for the purposes of linguistic and mathematics development within adult correctional centre classrooms, for a three-fold reason:

- To propose the prototype for employing translingual practices within adult mathematics teaching-learning contexts, and
- To reveal how adults' and children's use of full linguistic repertoire in the process of learning mathematics confluence and (or) differ.
- To probe into the functioning of translanguaging and the direct (or inverse proportionality thereof) with correctional contexts.

Scholars such as Akbar and Taqi (2020) endeavoured to explore the functioning of translanguaging as the pedagogical strategy within mathematics classrooms, by this means, arguing that it [translanguaging pedagogy] effectively develops learners' linguistics competencies and (their) ability to express deeper levels of thinking and mathematical problem-solving skills (also see Willging & de Oliveira, 2023).

As a matter of fact, (Marshall et al., 2023), in their subject specific attempt to explore the functioning of translanguaging pedagogies within mathematics classrooms, argue that it (translanguaging pedagogy) plays a significant role both in normalizing the linguistic practices of multilingual learners and in actualising the acceleration of mathematics conceptual understanding (Mbatha, 2024a). While the latter scholarly work laid the groundwork for the conceptualisation of the functioning of translanguaging within the context of mathematics classrooms, worth noting is that the inferences were drawn from the context of children's mathematics learning. Education research, whose foci are on the functioning of translanguaging within adults' mathematics learning is, in my view, minimal.

Again, while multilingualism and translingual practices transverse across different contexts, there is negligeable research on the working of translanguaging within the context of adult offenders' mathematics learning. In this paper, I therefore problematize monolingual andragogical approaches by investigating the functioning of translanguaging (and translingual andragogical practices) as the two-fold resource (i.e. resource for developing linguistic competence and mathematics understanding synchronically) within the context of adult mathematics correctional centre classrooms.

2.2 Conceptualizing the Peculiarities of Offenders and Offender Education

In this section, I operationalised scholarly literature to predicate the conceptualisation of offenders as a peculiar population that requires to undergo through the process of criminal and behavioural rehabilitation. By drawing from the plethora of the objectives of criminal rehabilitation processes which are

documented in Section 41 (1) of the South African Correctional Services Act (Act 111 of 1998), it can be concluded that rehabilitation processes seek to separate offenders from factors that led to criminal activities in the first place. In fact, several scholars document the role of rehabilitation processes mainly from what I call "recidivism viewpoint" (Ikoh, 2020; Muriuki et al., 2023) Arguably, rehabilitation processes further aim towards preparing offenders for the world of skilled trade post-incarceration (Mbatha, 2024a) while eliciting critical and synergistic thinking skills for problem solving during and post-incarceration (Mbatha et al., 2025). It is the coalescence of the aims of rehabilitation processes that disarticulates offenders from the "normal population."

2.2.1 Understanding Rehabilitation Processes as Distinguishing Factors between Offenders and the "Normal" Population

Rehabilitation processes entail different, fragmented components, with each (component) aiming to meet unique offenders' needs. The different rehabilitation components, according to Mulligan et al. (2025), decussate to formulate the rehabilitation cycle, which models the perfection of each offenders' rehabilitation process. Illustrated below are rehabilitation components and the intersperse thereof for the perfection of the rehabilitation cycle.

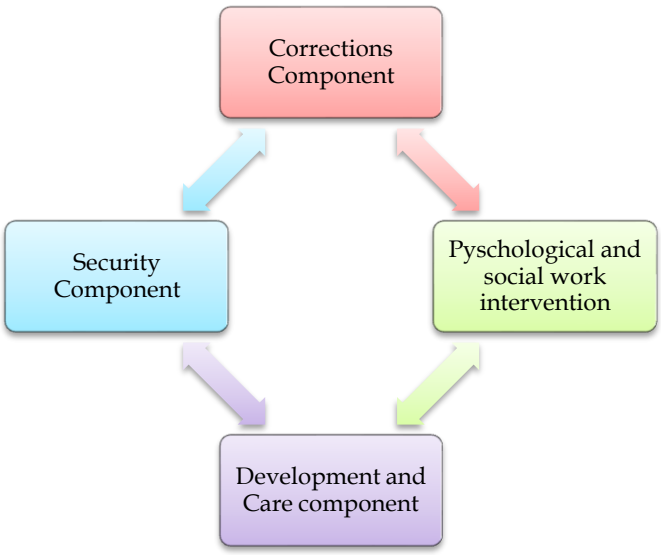


Figure 2: Rehabilitation components

While all four components are equally important in the completion of the rehabilitation cycle, my central focus in this paper is on the Development and Care component, under which there are offender education and skills development programs (Mukeredzi, 2021). This component, I argue, models the peculiarity of offenders because it entails of the unique primary health care, education, skills development programs and psychological interventions, which are particularly offered to rehabilitate offenders and prepare them for societal reintegration while rightfully meeting their needs as the citizens of South Africa (Khohliso & Mbatha, 2025). Based on the latter rehabilitation cycle, the contestation is that offenders (both adult and juvenile) have needs, which ought to be met through the process

of rehabilitation. In fact, Mokoele (2016), in his attempt to illuminate the importance of having offenders' needs met, termed them (offenders' needs) rehabilitation needs. There are scholarly arguments that contend that the Department of Correctional Services must provide programs that meet the rehabilitation needs of the offenders (Mbatha, 2024a; Vandala & Bendall, 2019). Because of their need for programs that aim at reducing recidivism while preparing them for societal reintegration, and because they are kept in what Armitage (2018) terms "protected spaces" for a period decided upon according to the judicial verdict, it can be argued that the offender population is atypical.

Worth noting is that while policy documents accentuate formal education programs (which is the sub-component of Development and care), scholarship whose central focus is on the importance of mathematics education, and the language use therein is limited. For example, Jovanić (2011) documents the importance of the role of offender education in actualizing the wholistic rehabilitation of offenders and the sound societal reintegration. Nonetheless, intellectual interventions that endeavor to explore the role of mathematics learning and the critical implications of language multiplicity in the learning of mathematics within correctional center mathematics classrooms are arguably minimal.

For this reason, in this paper, I documented the role of translanguaging in addressing the complex multilingual realities of adult offenders within mathematics classrooms. The paper sought to provide the pedagogical framework to be used in an endeavor towards developing adult offenders' mathematics and quantitative literacy, which hallways towards holistic offender rehabilitation.

2.3 Theorizing the Functioning of Translanguaging within Correctional Center Classrooms

The scholarship whose focus is on the use and functioning of translanguaging within the context of correctional center classrooms is minimal, particularly in South Africa. I therefore drew the scholarly literature on the use of translanguaging in adult teaching-learning contexts and used such (literature) as the framework through which translanguaging within the context of adult offenders' learning can be conceptualized.

For Rosén and Lundgren (2021), translanguaging and the use thereof, within the context of adult education, refers to language use(s) that seek(s) to challenge "monolingual pedagogies and andragogical practices". In an endeavour to illuminate on what "monolingual pedagogies and andragogical practices" entail, Hasan (2020) alludes that translanguaging pedagogy and andragogical practices are approaches that seek to create multilingual linguistic competences through the fluid use of languages in adult teaching-learning contexts.

Translanguaging may model the homogeneity between pedagogy and andragogy. However, what discriminates andragogy from pedagogy is that it [andragogy] is the art and science of helping adults to learn (Loeng, 2018) by grounding education process(es) upon the six guiding principles that be defined in the theoretical underpinning of this paper. Pedagogy, on the other hand, refers

to the art of science of teaching children (Loeng, 2023). The concept of translanguaging in the context of adult teaching-learning context is often permeated in discussions of adult migration and language literacy development for foreign languages (see Turnbull, 2019, for instance). Worth noting is that translanguaging pedagogy and andragogical practices have been discussed within the context of cross-curricular adult teaching and learning. There is minimal scholarly literature whose focus is on the use of translanguaging within the context of adult mathematics teaching and learning.

3. Theoretical Framework

I underpinned the study upon the Andragogic theory, which was developed by Malcolm Knowles, in 1984. The Andragogic theory was initially developed in the twentieth century as an instructional approach which can be operationalized in adult learning situations, after various debates around whether adults could learn or not. Following the in-depth analysis on adults' cognitive development, the six fundamental principles of andragogy were coined. These principles are based on learner-centered adult teaching ideologies, and they (the six principles) were coordinated to construct the framework for understanding andragogy and how it (andragogy) differs from pedagogy.

Although the Andragogic theory was developed in 1984, contemporary scholars argue that it still serves as the primary theory for practitioners seeking to understand and plan instruction for adults Taylor & Laros, 2014; Berriema et al., 2024). After the development of the theory of Andragogy, through tailoring the six assumptions that underpin adults' learning, several other scholars subsequently advocated for the adoption of the term "andragogy" to refer not only to theoretical ideas but also to focus on the creation of an independent, adaptable individual out of the adult learner (Tymchuk, 2021; Bouchrika, 2024; Knapke, 2024).

3.1 The Six Principles of Andragogy

According to Knowles (1984), adults' construction of knowledge can be conceptualized within the framework of the six coordinated principles, which are, self-concept, internal motivation, independence, experience, need for learning, and responsibility towards learning. These six principles centralize adult learners in learning processes (see Figure 3 below).

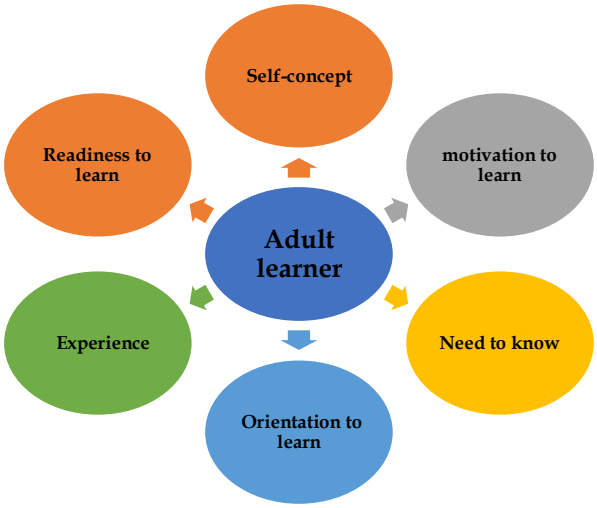


Figure 3: The principles of andragogy

The six principles are instrumental in understanding and analyzing the process of adult knowledge construction. In the discussion below, I described each of the six principles, alongside its educational implications on adult learning processes. Each of the six principles implicates adults' knowledge construction and subsequently guide adult educators and educationists to design and implement pertinent instructional approaches (Stavytska et al., 2022). Furthermore, they [six principles] model the role of language and language use in the development of adults' understanding of the subject matter. Hence, the six principles were used as a lens for analyzing the functioning of translingual approaches in adults' mathematics learning processes and in [adults'] development of multilingual competences within correctional center classrooms.

3.1.1 Need to Know

The assumption of the andragogic theory is that adult learners are aware of the reason behind their learning (Grus et al., 2024). Consequently, the theory postulates that adults are intentional about mastering and applying the subject content (Niksadat et al., 2022). Adults' teachers, nonetheless, remain responsible for clarifying on and about the benefits of learning by foregrounding lessons by explaining the learning objectives (Bouchrika, 2024). In other words, under this principle the adult teaching process is two-fold. Firstly, adults' teachers ought to structure their andragogical practice by taking into account adult learners' motives behind learning. Secondly, adults' teachers ought to clarify the learning objectives prior to, during and after the lesson (Lees, 2025).

In the context of adult offenders' mathematics learning, this principle implies that the need-to-know mathematics, even though it cannot be presumed for each adult offender, is commonly for the purposes of the completion of the rehabilitation process and for offender post-incarceration employment prospects. Hence, the objectives have to be aligned, even though not ostensibly, with those two fundamental need-to-know purposes. Furthermore, adult offenders need to develop both the understanding of mathematics (or quantitative literacy) and language competence synchronically. By considering their linguistic competences

and the expansion of multilingualism and bilingualism in correctional centre contexts, they (adult offenders) attend educational programs to acquire consummate linguistic repertoires, from which they will draw in their learning, cooperation and communicative contexts. This, in my view, ought to be elucidated as objectives in any mathematics learning in correctional centre contexts, particularly to aid adult offenders understand and recognize the significance of translanguaging (and translingual practices).

3.1.2 Self-Concept and Experience

In andragogic philosophy, adult learners understand themselves as active contributors in the learning process (Fogelberg, 2023). It is, therefore, an adult teachers' responsibility, to ensure that tasks given to adult learners elicit critical thinking, confidence, and high self-esteem. The discussion about the principle of self-concept cannot exclude the principle of experience because, for adult learners, experience is the foundation upon which content knowledge is assembled. Lewis and Bryan (2021) pointed out that adults accumulate a reservoir of experiences from their lifetime that becomes a rich resource for learning and a base upon which new learning can be built. Translanguaging, as Creese and Blackledge (2015) postulate, is both a communicative strategy in social settings and a pedagogical resource.

As such, the assumption is that adults have had translingual communications in social settings, which subsequently serves as the reservoir of experience upon which mathematics cognitive development is built. Experience(s) and pre-formal education familiarities are advantageous not only in developing adult learners cognitively but also in stimulating the formation of adults' conceptual understanding in the brains, which, according to Sukardjo and Salam (2020) is advanced through language. Therefore, language use (translanguaging in this context), in social settings is conceptualized as the fundamental experience upon which mathematics understanding emanates.

The andragogic principle of experience and self-concept are intertwined and can be used to assume the experience-based and self-concept aligned andragogical strategies in adult correctional center classrooms (Mbatha, 2024b). In other words, educationists can use these two principles in their andragogical practices as the "scaffold" for developing adult offenders to the advanced level of abstraction because adults' self-understanding (i.e. understanding themselves as multilingual beings, with the plethora of linguistic repertoires) hallways towards the use of multilingual competences to elicit the understanding of mathematics (and any other subject matter).

3.1.3 Motivation to Learn

According to the Andragogic theoretical stance, adult learners' lack of motivation to learn causes reduced classroom participation, because motivated adult learners interact optimistically with the teacher and other peers (Wlodkowski and Ginsberg (2017). Adult learners' motivation to learn emanates from both internal and external factors. Internal motivation factors are related to self-concept and the need to learn (which has been discussed above), while external factors include appraisals, teacher motivations, interactions (with fellow adult learners), the

appealing and inspiring surrounding environment and safe ambience. Either way, individual adult learners' motivation is drawn from active participation in the learning process, inquiry-based learning, accommodating language use (translanguaging, in this context) and learner-centeredness. Both external and internal motivations arguably form part of the andragogical approaches to be employed in the process of teaching mathematics to adults. Likewise, the use and the functioning of language in mathematics classrooms prompts motivation to learn.

3.1.4 Orientation to Learn

Even though experience is important in adult learning, adults' teachers still need to orientate adult learners on how to integrate new information into the pre-existing pattern of experience (Kassie & Astell, 2025). Furthermore, neuroimaging studies affirm that without teacher orientation, the pattern of existing experiences might cause misconceptions and misinterpretations of new content (Botha, 2021; Grus, 2024). In this context, it is argued that translanguaging communication used in social contexts ought to be aligned and integrated with the Language of Teaching and Learning used in mathematics classrooms to guarantee the development of both linguistic competence and mathematics understanding.

3.1.5 Readiness to Learn

Adult learners learn best when the process of learning can help them solve an immediate real-life problem. Their time perspective changes from one of the future applications of knowledge to one of the immediate applications, giving them a problem-centered rather than a subject-centered orientation to learning. In this regard, adults' readiness is more oriented toward the development of their social roles as opposed to achieving good academic results. This principle is often discussed concurrently with the principle of motivation because motivation increases in adults when there is an immediate reason to learn. This principle serves as lens to this study because language multiplicity and translingual proficiency is deemed resourceful in the process of solving mathematical skills and in immediate development of multilingual (or language) proficiency.

3.2 The Implications of the Six Principles of Andragogy in Exploring the Functioning of Translingual Practices in Correctional Center Mathematics Classrooms

The six principles of andragogy, I argue, model the role of language in the development of mathematics understanding and multilingual competence. Readiness to learn, self-concept, orientation to learn and experience, for instance, indicate that adults are independent beings, who are multilingual and have had experiences of using translanguaging in social contexts. This experience is fundamental in advancing their readiness to learn because the use of translanguaging serves as the scaffold that hallways them towards solving mathematical skills.

Furthermore, adult offenders use their translingual competences as the pre-existing language knowledge that is integrated with mathematics register to elicit mathematics understanding. Using translanguaging, adult offenders develop the reason behind learning (need to know) because translanguaging models the

development of multilingual competence and mathematics understanding synchronically. The fluid use of adult offenders' home language and other languages motivates them (adult offenders) to learn mathematics, since it is taught and learnt through the medium of their home language and First Additional Language. These six principles will be used as a lens for understanding the functioning of translingual practices in correctional center mathematics classrooms. The central focus will be on the linguistic and mathematical relevance of translingual practices.

4. Contextualizing the Study

The study was contextualized within one of the correctional centers in the province of KwaZulu-Natal, in South Africa. Through the intervention study on the use of the three-dimensional approach for teaching addition and subtraction through the medium of isiZulu, I inferred findings that divulged the crucial role of translanguaging pedagogy in developing adult offenders' mathematics conceptual understanding.

Because of the multilingualism in correctional centre classrooms, and because of the intertwinement of language and mathematics, I subsequently investigated translingual practices in depth, thereby probing into their role in developing both multilingual competence and mathematics understanding synchronically. Furthermore, based on the findings of this study, I predicated the proposal of the andragogical framework, which can be employed by educationists in their use of translingual practices within correctional center mathematics classrooms.

5. Research Methodology

In this study, I adopted the pragmatic epistemological stance, acknowledging both quantitative and qualitative data as pertinent for investigating the functioning of translingual practices in adult correctional centre classrooms. Twenty mathematics educationists were purposively sampled from the total population of 25 (n=25) educationists rendering formal education services within the selected correctional centre. The educationists that were sampled were those that teach mathematics across AET levels in both medium and maximum sub-correctional centres within the selected correctional centre.

From the selected correctional centre, 250 adult offenders were randomly sampled. Adult offenders were those who were consistent in their attendance of formal education programs (mathematics, in particular). Their selection was based on neither the length of their sentences nor the nature of the offences that led to their incarceration. The age of adult offenders was not observed because the study was contextualised in a correctional centre that is designated for adults (i.e. offenders aged 25 and above).

Participants were informed of anonymity and confidentiality. I also indicated to the participants that their participation was purely voluntary and that they were not deprived of their right to withdraw their participation at any given time should they wish to do so. Likewise, all participants signed forms indicating their consent to participate in the study. I sought and acquired the gatekeepers'

permission from the South African National Commissioner of the Department of Correctional Services. I further applied for and acquired ethical clearance to conduct the study. The validity of quantitative data was ensured by the triangulation of two data collection tools (pre and post-tests) while the trustworthiness of the qualitative data was ensured through member checking (i.e. involving participants in reviewing findings to ensure accuracy and that interpretations align with the views).

Prior to the collection of qualitative data, I requested to record the proceedings using a tape recorder. In my attempt to ensure the accuracy of the translation of data (from isiZulu to English), I used the expertise of a language expert, who evaluated appropriateness, tone, and style in the translated text. Permission to record semi-structured interview proceedings and pre and post-test scores was obtained from participants.

I framed the study within the convergent parallel mixed methods research design, which is a design where quantitative and qualitative data are collected concurrently, analysed separately, and then compared to gain a comprehensive understanding of a phenomenon in question. This research design was suitable for this study to support quantitative and qualitative methods. Furthermore, the study design was selected because it allows for validation, where findings from one method corroborate findings from the other, leading to deeper insights and more robust conclusions.

In this study, I utilized two instruments. For quantitative data, pre-tests and post-tests were administered, while, for qualitative data, a semi-structured interview schedule was used. I used quantitative data that was analyzed by *SPSS* through *t-test* (i.e. the analysis that sought to observe the mean difference between pre-tests and post-tests) parallel with qualitative data (which was analyzed thematically from semi-structured interviews with educationists).

6. Discussion of Findings

6.1 Quantitative Results

6.1.1 Test of normality

The failure of normality assumptions rules out the accuracy and the reliability of conclusions about the reality (Öztuna et al., 2006). In this study, I did the Shapiro-Wilk test to ascertain whether the data were normally distributed or not. I further did the Shapiro-Wilk test to determine whether the comparison should be done using parametric or non-parametric test.

In the Shapiro-Wilk test, the alpha value which is greater than .05 ($p > 0.5$) determines the normality of data. The null hypothesis (H_0) was that the pre and post-test scores were normally distributed. I used the table below to determine the normality of data, and to establish whether the null hypothesis should be accepted or rejected.

Table 1: The tests of normality table

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pretest	,100	250	,200*	,977	250	,422
Post-test	,117	250	,085	,965	250	,131

According to the tests of normality table, for both pre-test and post-test 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 was 0.422, which was greater than 0.05; and for the post-test, the p-value was 0.131, which was greater than 0.05).

6.1.2 Paired samples t-test results

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

The null hypothesis: The difference between the paired sample means was equivalent to zero. This denotes that the use of translanguaging did not have any impact on offenders' mathematics understanding and metalinguistic competence because the pre-test and post-test means were the same.

The alternative hypothesis: The difference of the paired sample means was NOT equivalent to zero. This denotes that the use of translanguaging had a significant impact on offenders' mathematics conceptual understanding and metalinguistic awareness because the pre-test score mean differs significantly from the post-test score mean.

I used the following paired samples *t*-test to observe if the use of translanguaging had a significant impact on adult offenders' mathematics conceptual understanding and metalinguistic awareness.

Table 2: The paired samples *t*-test results

		Paired Differences					T	Df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	Pretest – Post-test	-25,06000	6,239	,5996	-15,26494	-12,85506	-25,439	250	<.001	<.001

According to the paired samples *t*-test results in table 2 above, the difference between the pre-test and the post-test mean was negative. This connotes that the post-test scores were higher than the pre-test scores. To establish if the mean difference was statistically significant, the *t*-value had to be greater than the critical value of 2,045. For this study, the *t*-value was 25,439 (a negative sign denotes that the pre-test mean score was lower than the post-test mean score), which was much greater than the critical value of 2,045. 25,439 > 2,045. Furthermore, the lower and the upper 95% Confidence interval of the difference had values which had negative signs. This means the mean difference of -25,06000 (between the pre-test and post-test score mean scores) was statistically significant.

6.2 Qualitative findings and discussion

During the process of thematically analyzing qualitative data, I came out with two prevalent themes. Although the themes appeared to be discrete, I discovered overlapping pieces of data that subsequently caused the themes to converge and intertwine (see Figure 3 below). Furthermore, I deliberately intersected and coordinated the pieces of data to address the following research question, which served as the guideline for this research endeavor:

- **How do translanguaging approaches affect adult offenders' metalinguistic awareness and mathematics conceptual understanding compared to traditional monolingual approaches?**

I further used the data presented and discussed in this context to propose the andragogical framework which can offer practical guidance for educationists seeking to implement translanguaging approaches in correctional centre mathematics classrooms, while accommodating adult offenders' learning preferences and multilingual development.

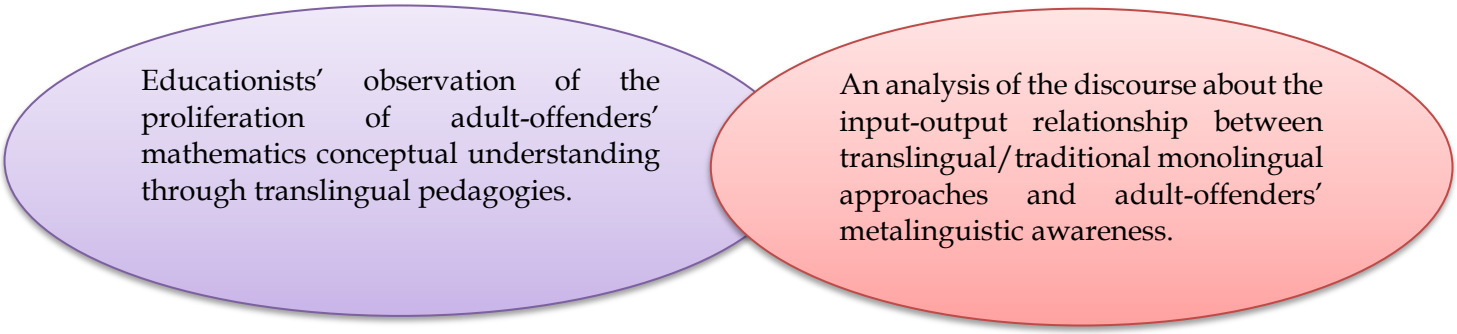


Figure 4: The interlink between the themes

6.2.1 Educationists' Observation of the Proliferation of Adult-offenders' Mathematics Conceptual Understanding through Translingual pedagogies

Erath et al. (2021) underscore the role of interaction in actualising the advancement of mathematics conceptual understanding, thereby advocating for language responsive mathematics pedagogies. On the other hand, scholarship has identified the importance of eliciting mathematics competence in multilingual classrooms contexts (Prediger & Uribe, 2021). In other words, research has typically revealed the interdependence between language and mathematics (Wilkinson, 2019; Peng et al., 2020). This interdependence, I argue, is further intensified and strengthened by language multiplicity within mathematics classrooms, which calls for the deployment of multilingual pedagogies, seeking to meet the language and mathematics learning preferences of multilingual learners.

There has been polarized debates on whether multilingualism is a resource or a problem in mathematics classrooms. For example, Blommaert et al. (2012) perceives multilingualism as a problem to be confronted and solved whereas Phakeng (2018) and de Jong et al. (2020) observe multilingualism as the resource. On account of the fact that contemporary bodies of scholarship identify

multilingualism as the resource, and not a problem (Planas, 2021), the use of several multilingual pedagogies has been piloted. For example, Phakeng (2018); Maluleke (2019) and Essien and Moleko (2025) investigated the role and the functioning of code-switching in multilingual mathematics classrooms. Because code-switching has been significantly criticized for causing linguistic setback, in this study, I used the perspectives of adult offenders' educationists to underscore the role and the functioning of translanguaging as the fulcrum of the advancement of mathematics conceptual understanding.

Educationist A revealed that he observed the proliferation of adult offenders' conceptual understanding, owing to the use of translingual pedagogical practices.

> *"I did not know that there is something that is called translanguaging. I learnt that translanguaging is the fluid use of languages to transmit meaning. I then realised that wow! In fact, I have been employing translingual pedagogical practices all along. The important thing is that the AET curriculum policy does not allow us to use translanguaging, but we do because we are thinking of offenders. For me, it has worked. After employing translanguaging, I notice a great deal of improvement in adult offenders' understanding of mathematical concepts."*

Educationist A revealed the conceptualisation of translanguaging as the fluid use of languages and linguistic repertoires for the purposes of making meaning and for transmitting knowledge. This conceptualisation is similar to that which is documented in the scholarly work of Vogel and García (2017) as follows:

> *As a pedagogical practice, translanguaging leverages the fluid use of languages by learners, in ways that deepen their engagement and comprehension of complex content and texts. In addition, translanguaging pedagogy develops both named languages that are the object of bilingual instruction precisely because it considers them in a horizontal continuum as part of the learners' linguistic repertoire.* (Vogel & Garcia, 2017, pp. 21)

Arguably, for **educationist A**, the use of translanguaging deepens the comprehension of adult offenders' conceptual understanding (as Vogel & Garcia, 2017 posit). Although it was not apparent whether the context within which **educationist A** apply translanguaging is bilingual or multilingual, **educationist B** clarified that the deployment of translingual practices, particularly within multilingual correctional centre classrooms, developed adult offenders' conceptual understanding of mathematics. Furthermore, while the response of **educationist A** was not focusing on a particular curriculum aspect, **educationist B** indicated that there was a discernible incline in adult offenders' conceptual understanding, particularly in the aspect of number and number relations.

Educationist B:

> *"Translanguaging helps. Adult offenders that we teach are multilingual and the sabela language also adds in the pool of multiple languages spoken within the correctional facility. Coming to your question, I use translanguaging across the mathematics curriculum, but I have particularly observed the role that it [translanguaging] plays in the development of numbers and number relations. I remember one time I*

> *taught numbers and number relations using the part-part-whole concept. This concept is usually difficult, but because it was taught through translanguaging, adult offenders performed much better in the topic test, with 80% of them getting level 7's (80%-100%). But most importantly, combined their experiences with translingual pedagogical practices. I think one needs to tread very carefully around how translanguaging is used in adult mathematics classrooms. I also make the lesson objectives clear, while I use translanguaging."*

For **educationist B**, the concept of numbers and number relations was developed significantly because of the use of translanguaging. Of paramount importance is how **education B** revealed the role of translingual pedagogical practices in developing conceptual understanding of part-part-whole relations. In fact, according to Fritz and Dampier (2013), the comprehension of the part-part-whole relation between numbers is a critical conceptual aspect, which ought to be developed in the teaching of early numeracy. Again, **educationist B** revealed that the principles of andragogy ought to be infused in translingual pedagogical practices. For example, there was an indication of the importance of the principle of experience and orientation to learn.

The findings designated the importance and the functioning of translingual practices adult mathematics classrooms. Furthermore, according to the findings, translingual pedagogical practices are fundamental in the andragogical practice, since it intersects with the principles of andragogy (i.e. orientation to learn and experiences). In my view, the principles of andragogy, as posited by Knowles (1984) are to be combined with translingual andragogic practices to tailor the contemporary andragogic framework, particularly because of the expansion of multilingualism in correctional centre mathematics classrooms.

Again, motivation to learn and translingual andragogy appeared to be resourceful in scaffolding adult offenders to the deeper understanding of mathematics. For example, **educationist C** indicated that through translanguaging, adult offenders seemed to be motivated and perform better in mathematics, particularly if their language identities (i.e. the use of the *sabela* language) are operationalised as adult offenders' linguistic repertoires.

Educationist C

> *"How I use translanguaging is a bit different. I use the sabela language and integrate it with English to help them realise the practical applicability of mathematics."*

The latter verbatim words by **educationist C** illuminate the importance of translanguaging in adult mathematics classrooms. This further explains why adult offenders seemed to perform better in the post-test. Again, the fluid use of English and the *sabela* language outlines the revolutionary idea that even informal languages can be fluidly integrated with the language of teaching and learning (i.e. English) to elicit meaning construction, particularly in correctional centre classrooms. As a matter of fact, this authorises the findings that were inferred by Mbatha and Khohliso (2024), which designated the role of translanguaging in

constructing adult offenders' language identities, thereby developing advancing adult offenders mathematics understanding. I argue that educationists ought to acquaint themselves with the *sabela* language to assemble mathematics teaching upon Knowles' (1984) principle of experience. This, according to the verbatim words of **educationist C**, makes adult offenders to see the practical applicability of mathematics during and post incarceration.

6.2.2 An analysis of the discourse about the input-output relationship between translingual/traditional monolingual approaches and adult-offenders' metalinguistic awareness

Despite the expansion of multilingualism in adults' and children's mathematics classrooms, there is still a tradition of teaching mathematics through a monolingual approach, even when educational programs aim at the development of multilingual competences. Again, I argue that there is still what Gorter and Cenoz (2014); Carroll (2022) and MacSwan (2019) term "two solitudes" when referring to the separate use of languages in mathematics classrooms. This is still the case even at the contemporary time where the large cohort of learners fluidly use languages in social and conversational situations. The scholarly postulations which are for the use of translingual approaches designate the instrumentality of translanguaging in embracing learners' multilingual competences while developing metalinguistic awareness and mathematical understanding (Tai & Wei, 2021; Christensen, 2024; Tai, 2024; Walla, 2025).

The discussion of metalinguistic awareness within the context of mathematics teaching and learning may appear to be perplexing. However, according to Jessner et al. (2016) metalinguistic awareness refers to the ability to understand the linguistic form and the meaning. In other words, metalinguistic awareness is the ability to comprehend specific language used to discuss or describe language itself (Jessner, 2017). It includes the knowledge of technical terms for grammatical elements like "sentence" or "adjective." Because of the growing scholarly philosophy for the teaching of language across the curriculum (Jessner, 2017; Parveen et al., 2022; Southworth et al., 2023; Steele et al., 2023), investigating the role of translanguaging in developing metalinguistic awareness of English within mathematics classrooms is a timely research endeavour.

Although findings have indicated that translanguaging catalyses metalinguistic awareness of English language, particularly for learners whom English language is not their own, the occurrences of using monolingual approaches in multilingual mathematics classrooms (in particular), underscore the need to juxtapose the impact of translingual approaches with that of monolingual approaches in advancing metalinguistic awareness in mathematics multilingual classrooms. The findings from this study indicated that translingual approaches hallway towards the advancement of English metalinguistic awareness (in mathematics classrooms), compared to monolingual approaches. For example, **educationist D** indicated that her fluid use of English, isiZulu, Afrikaans and *sabela* language made adult offenders to understand the difference between English nouns, verbs and adjectives, even within mathematics classrooms.

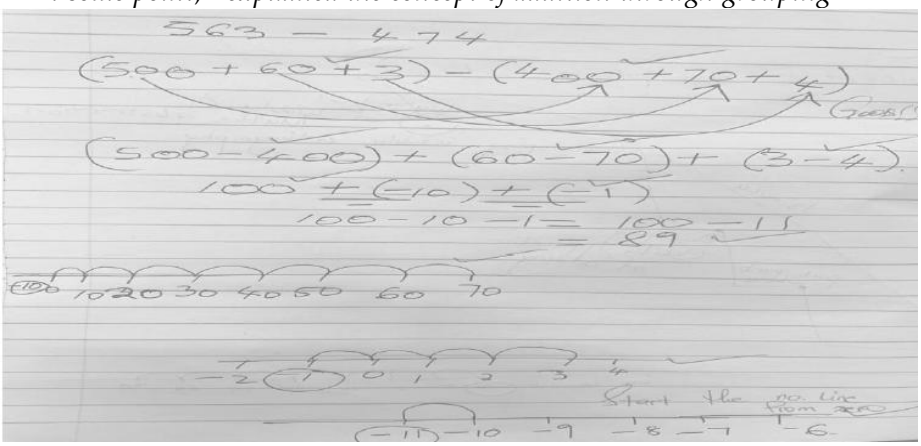
Educationist D

> *"There has been a complaint that adult offenders are not competent in English, hence they ought to be taught all subjects through the English medium. I have proven this otherwise. In my mathematics classes, I integrate English with isiZulu Afrikaans and sabela language. To my surprise, the adult offenders now know the difference between nouns, verbs and adjectives. I have also noticed that when they motivate their answers in mathematics, the subject-verb agreement errors are minimal.''*

Traditionally, developing the learners' metalinguistic awareness of English was associated with monolingual pedagogical approaches. The verbatim words of **educationist D** indicated that translingual pedagogical practices are in fact instrumental in developing the English metalanguage of adult offenders. Additionally, educationist E indicated that translingual pedagogical approaches simultaneously develop mathematics understanding and English metalinguistic awareness.

Educationist E

At some point, I explained the concept of addition through grouping



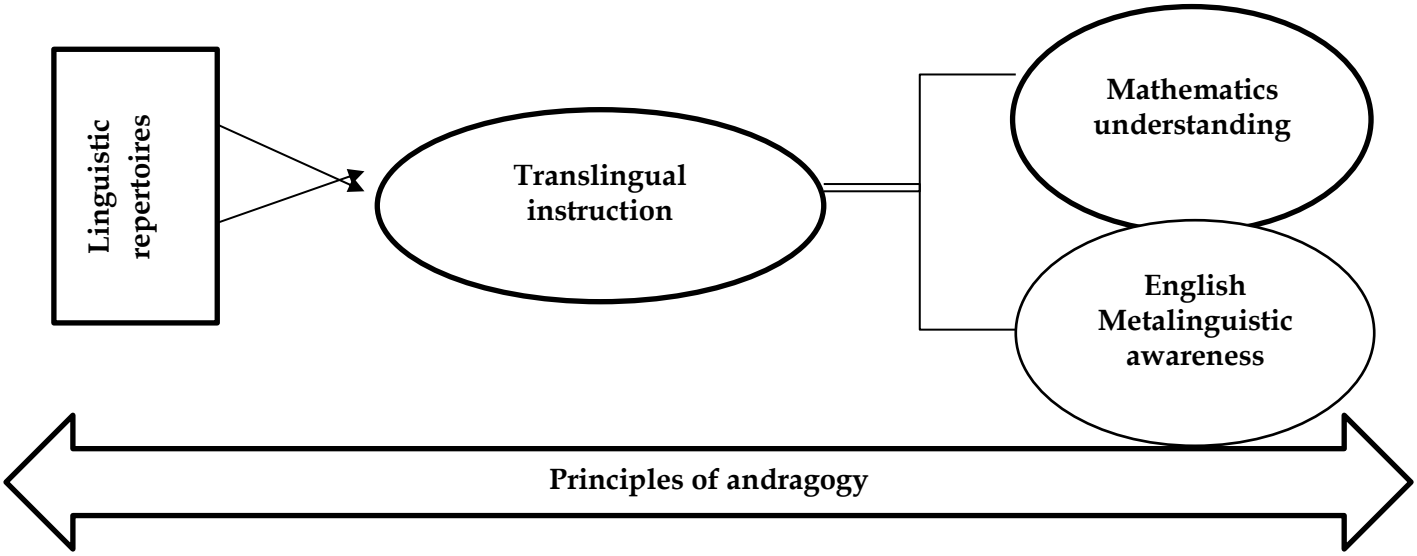
> *"I used translanguaging throughout the lesson. Adult offenders asked if the word "grouping" is a verb, or maybe when you are having a conversation in English, you only use it as a noun "group." I had to explain, and I gave them exemplary sentences. Although my explanation was through translanguaging, because I used the language that they are familiar with, which is a sabela language, they understood and (they) could have conversations in English."*

Educationist E indicated that he developed the metalinguistic awareness of nouns and verbs during mathematics lessons, and adult offenders developed the proficiency in both English and mathematics procedural fluency. Of paramount importance is that both **educationist D** and **E** underscored the role of establishing and using adult offenders' experiences (i.e. *sabela* language) in the development of both mathematical knowledge and English metalinguistic awareness. This outlines the importance of the principle of experience [as posited by Knowles, 1984, in the andragogic theory] in developing both metalinguistic proficiency and mathematical knowledge. Again, the two educationists contested the idea that

monolingual approaches hallway towards the advancement of metalinguistic awareness. I therefore argue that it is only through translingual practices that mathematics understanding and metalinguistic awareness is advanced. In fact, this explains why the post-test scores, which were administered after the use of translanguaging, had the highest mean difference compared to the pre-test scores.

7. Recommendations: The andragogical framework for implementing translanguaging in correctional center mathematics classrooms

Based on the qualitative and quantitative findings, I recommended the andragogic framework for systematically integrating translanguaging into correctional center mathematics classrooms. The framework further illustrates how translanguaging can be used to foster linguistic repertoire expansion, mathematics understanding and metalinguistic awareness. In view, the andragogical framework presented in this section offers practical guidance for educationists seeking to implement translanguaging approaches in correctional center mathematics classrooms, while accommodating adult offenders' learning preferences and multilingual development.



The andragogic framework suggests that prior to the integration of translanguaging into adult correctional center mathematics classrooms, educationists ought to establish different language competencies that adult offenders come with. In other words, mathematics educationists ought to establish the linguistic repertoires for each adult offender. This subsequently determines the different languages that are to be used fluidly in the instruction process.

In other words, after finding out different language varieties/linguistic repertoires, an educationist must himself or herself be multilingual and skillful in fluidly blending the different linguistic repertoires for the purposes of making meaning. The translingual instructional approach should aim at advancing mathematics understanding and English metalinguistic awareness synchronically. In other words, in the process of teaching mathematics using translingual andragogy, there should be attempts of developing English

proficiency, by focusing particularly on the advancement of metalanguage, since adult offenders are assessed solely through the medium of English. I argue that the andragogic framework should be cemented upon the principles of andragogy, as posited by Knowles (1984). For example, the process of establishing the linguistic repertoires arguably includes the method of establishing adult offenders' experiences (about languages and about mathematics), thereby using those experiences as the groundwork upon which new mathematical and metalinguistic knowledge is predicated.

8. Conclusion, limitations and implications

In this paper, I investigated the role of translingual andragogic practices in the synchronic development of English metalinguistic awareness and mathematics conceptual understanding. The focus was on one selected adult correctional center classroom. From the findings, it can be summarized that translanguaging plays the fundamental role in developing adult offenders' mathematics conceptual understanding and English metalinguistic awareness compared to the monolingual teaching approach. Based on the findings of the study, I proposed the andragogical framework, which can be used as the practical guideline for educationists seeking to implement translanguaging approaches in correctional center mathematics classrooms, while accommodating adult offenders' learning preferences and multilingual development.

Despite the study's contribution to the field of offender mathematics teaching, there were limitations. Amongst the limitations were the study's focus on a single correctional center, which thus underscores that the functioning of translanguaging cannot be generalized across different correctional center classrooms. Again, the sample size for the qualitative part of data was small which could have led to the study being biased. The implications for research are that studies that explore the role and the functioning of multilingual pedagogies, particularly within the context of adult correctional center classrooms, should be conducted for two reasons.

Firstly, because of the expansion of multilingualism and secondly because adult offender mathematics education is the phenomenon that receives minimal scholarly attention. The Adult Education and Training Policy framework as well as the White Paper on Corrections can review the Language of Learning and Teaching Policy, particularly since most offenders learn mathematics in a language that is not their own. The implications for practice are that educationists should consider combining translingual practices with the principles of andragogy. This study can be replicated with a larger sample of educationists and in different correctional centers. Furthermore, other data collection methods can be used, such as questionnaires and classroom observations.

9. Conflict of Interest, Acknowledgements, etc.

The author declares no conflict of interest.

10. Acknowledgements

There are no acknowledgments to make whatsoever.

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