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Exploring English Medium of Instruction for FET Mathematics Content Teachers: Teaching Pedagogy

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Abstract
South Africa is a diverse country which consists of vast multimodalities such as multicultural and multilingual practices and standards. This diversity is integrated into various economic sectors whereby the common practices must be assimilated to achieve specific goals. Therefore, the educational sector is not immune from assimilating these diverse cultural and linguistic practices; hence the language of learning and teaching (LOLT), informed by the geographical location of the dominating dialect, is adopted to enhance the teaching and learning. Conversely, when learners transit from one phase or grade to the other, the LOLT become a learning barrier because English as medium of instruction (EMI) is used as the first additional and/or second language (FAL/L2). As a result, learners grapple with the conceptualisation of subject matter. Using participatory action research (PAR), this paper analyses the use of English as a medium of instruction for Mathematics content teachers in further education and training (FET) where ten (10) FET teachers and five (5) learners were purposively sampled. Structured interviews were conducted to generate qualitative data. In addition, critical discourse analysis (CDA) was employed to analyse the findings. In brief, the paper established that the relevant language and culture of a particular vicinity and the indigenous knowledge system (IKS) derived from traditional games have a direct impact on the development of the pedagogical content knowledge of Mathematics content and aid the acquisition of English as a second language. Therefore, the study established that English as a medium of instruction exposes learners to the international community and leverages their subject content teaching pedagogy across all critical subjects such as Mathematics.

Keywords: Mathematics content teachers, English as a medium of instruction, language of learning and teaching, English second language and teaching pedagogy

1. Background and Introduction

The South African historical transition into a democratic dispensation birthed not only a political reformative system but also impacted upon the education system. In this education system, the historical injustices accrued from the apartheid regime segregated ethnic groups according to their creed, race and language, promoting English as a medium of instruction at the expense of

indigenous languages. In a quest to redress these injustices, the crucial elements of identity received significant attention in the Constitution (Act 108, 1996). This Act is considered as a supreme law of the country which implies any form of statutory provision or law that is viewed and interpreted to be incompatible with the Constitution is invalid and unlawful. In addition, the Language in Education Policy (1996) and the establishment of the Pan South African Language Board (PanSALB) established in terms of Pan South African Language Board Act (1996) gave impetus by means of a transformative agenda to the language of learning and teaching (LOLT).

As a result, the Use of Official Languages Act 12 of 2012 was promulgated to recognise eleven (11) indigenous languages in South Africa and by extension, within the education system. This recognition, although somewhat controversial to certain extent, manifested positive results about the use of a vernacular, particularly in the foundation phase, as the language of learning and teaching. This promulgation accounts for a litany of strides accomplished in respect to redressing the injustices of the past and paved the way for a bright future (Hsieh, 2020). Therefore, the LOLT purported dichotomies of linguistic perspectives for adoption in the form of monolingual or bilingual language policies (Pardos & Bhandari, 2023). The school governing bodies possess the ultimate discretionary right to adopt a relevant dialect for the LOTL according to the geographic location of the school and the prominent ethnicity. Equally, the principles of monolingualism versus bilingualism serve as a distinctive feature which identifies the dominating vernacular in a particular area.

As postulated by Blocks and Monaco (2022), the contention of language choice, especially monolingual use, is influenced by a dominating vernacular. This implies that the choice of a vernacular for a school honours the enshrined principles of the Constitution and recognises the significance of ethnicity in that area. However, these milestone achievements of the Constitution, namely the education language policy, the use of official language policy and the introduction of PanSALB are mere attributes to endorse indigenous languages, redress the injustices of the past and promote the recognition of African languages.

Despite these milestone achievements, English as a medium of instruction (EMI) has a significant impact and vital role in our education system. Most importantly, African languages as home language (first language) have begun to enjoy profound recognition post-1994 in conjunction with English as medium of instruction (South African Qualifications Authority [SAQA], 2021). However, the perennial relationship between home languages and English continues to confront a plethora of challenges, particularly on critical content subjects. Hence, EMI is widely used to promote the internationalisation of subjects (Ozaki & Ueda, 2021), students' mobility or exchange programmes which imply English learning as a primary objective (Zhai, 2023) and English as the core element of a diverse linguistic environment (Zhai, 2022).

Amid these aims, EMI is adopted not only to promote these aims, but also to afford both African languages and English an equal footing in our education system (Lakshmanan, 2022). Although stating the obvious, EMI, irrespective of its aims, does not alleviate the challenges but cushions the landscape of these challenges. The scale of challenges to teach content subjects using EMI is compounded not only by a lack of English proficiency but also by the vacuum of pedagogy of English as a subject matter (Baker & Huttner, 2019). This assertion refers to the content subject teachers' method versus the acquisition of English proficiency. This entails that content subject teachers must have acquired adequate English proficiency because concepts and explanations are structured in English. For example, Mathematics is a critical subject which contains complex equations and formulae for conceptualisation. These are interpreted and structured in English. Thus, it is imperative for the Mathematics content teachers to possess both the Mathematic methodologies and English proficiency (Pitura, 2022).

In essence, the paper analysed the use of EMI for teaching Mathematics in a context in which English as a First Additional Language (FAL) is uses as the LOLT. For in-depth analysis, EMI is defined as the language of learning and teaching in a place or area where the population or dominating ethnic group does not use English as a home language (Blocks & Monaco, 2022). In contrast, the LOLT is considered to have generated a diversity of nuances where educational perspectives informed by teaching pedagogies culminated in different terminologies (Macaro et al., 2020). For instance, in North America LOLT is regarded as content-based language learning (CLL) and in Europe as content and language integrated learning (CLIL). Universally these are interpreted as EMI (Hu & Wu, 2020). Consequently, EMI constitutes the rationale for our research aim in relation to Mathematics content teachers and as such, EMI's impact on the general performance of Mathematics' learners and teachers has been analysed.

The genesis of this analysis originated from the challenges purported by Trends in International Mathematics and Science Studies (TIMSS, 2019) in relation with Primary in International Reading and Literacy Studies (PIRLS, 2016 & 2020). Employing participatory action research (PAR) as a research design, the paper aimed to analyse the effects of using EMI for FET Mathematics content teachers. This aim was considered to be achieved by the following objectives: a) to evaluate the challenges of FET Mathematics compounded by the use of English as the LOLT and, b) to determine the successes of using EMI in FETs for teaching Mathematics content. These objectives were geared to respond to the research question outlined as: What are the successes of using EMI for teaching FET Mathematics content?

2. Theorising EMI in the Context of Teaching Mathematics

The paper aimed to evaluate the effects of EMI in the context of edifying Mathematics subject matter. It is therefore necessary to examine the intricacies of the theory that interface with the mandate of Mathematics teachers discharging their teaching tasks competently using EMI. Therefore, critical pedagogy aims at dismantling the dominating power dynamics that marginalise and subdue those who are illiterate (Freire, 1996). This theory adopts a significant educational approach of interrogating the social, cultural and political spheres which are not characteristic of a society and which perpetuate inequality and exclusion (Gurung & Shrestha, 2023). Thus, it is necessary to extrapolate the theoretical framework that underpinned this study.

To begin with, English and Mathematics are critical subjects which pertain to high levels of intellectual pedigree and rigour. An individual with the mental faculties of articulating and synthesising complex linguistic phenomena of the English language and solving logical and sophisticated Mathematical phenomena, is considered to be intelligent, according to Gardners' multiple intelligences (Morgan, 2021). As a result, such an individual has the ability to influence, wittingly or unwittingly, society in a positive or negative manner. Therefore, it is important to employ the core principles of critical pedagogy so that the requisite of state of equality and mutual respect within the society is achieved.

Critical pedagogy is developed to lead to equality, mutual respect, empowerment and emancipation (Badri, 2024). It is a theory that allow learners to assess social and cultural norms, and interrogate them rather than developing nuances which seek to perpetuate such impositions (Badri, 2024*)*. Consequently, English and Mathematics make provision for critical thinking and robust engagements regarding the social phenomena that impact society. In this way, to have intellectually liberated and independent learners achieves the purpose of education. Critical pedagogy thus enables both learners and teachers of English and Mathematics to engage in an in-depth understanding of social constructs (Vygostky, 1978).

Despite the aims of critical pedagogy, Mathematics must be learned and taught in a conducive environment free from both external and internal forces of disruption. Equally, English as a language and as used in scientific subjects, requires a similar environment. To enable such an environment, it is advisable to employ the framework of critical pedagogy which seeks to empower, emancipate and infuse critical thinking among learners (Karp, 2023). This aligns with the perspective of embracing diverse learners' experiences and existing knowledge as this allows learners to recognise their own abilities and participate actively in the process of learning and teaching.

In summation, the profound elements of critical pedagogy are nascent approaches of the hybridity of teaching and learning with the synergy of empowering, emancipating and fostering mutual respect. Logically, these elements provide intricately interwoven dynamics of using EMI to learn Mathematical content with zeal, diligence and dedication. It further concretises and revolutionises the environment of learning and teaching with its flexibility, duality and sophistication. In brief, critical pedagogy and participatory action research are key foundational factors in this study because of their similar principles and ethos.

3. Methodology

This is a qualitative paper based on the principles of PAR as a research design. In addition, critical emancipatory research as a paradigm is employed as a research lens to conduct these analyses. PAR is characterised by the principles of empowerment, mutual learning and development, recreation of knowledge and social insights, and emancipation of social subjects (Kearney et al., 2013). Traditionally, a principal researcher is considered as an expert who conducts social inquiries using research instruments. On the other hand, participants are regarded as the engineers or source of data (Msimanga, 2017) and thus afford the principal researcher an opportunity to generate the qualitative data for analysis. Therefore, the postulated view of regarding a principal researcher as an expert does not qualify as the premise for the principles of PAR. Suffice it to say that new social insights and expertise are generated in collaboration with participants; as such, the term "participants" for the purposes of PAR is devoid of mutuality and empowerment, and thus it is logical to consider participants as co-researchers.

The rationale of using PAR is espoused on the premise that its fundamental principles of liberty, empowerment, equality and mutual respect serve as the core elements of production of knowledge. This supposition is contained in the assertion of Smith (2021) who opined that power relations are key in a social inquiry. Therefore, the emphasis of equality and inclusivity do not only upheld power dynamics and relations but also seek to sustain mutual respect and dignity. Therefore, PAR is relevant because it has similar core elements of critical pedagogy of equality, mutual respect and social empowerment. PAR is conducted in three phases, i.e., the planning (action) phase, observation phase and reflection phase (Marze, 2022). It is during these phases in which the principal researchers establish a collaborative relationship where participants are divided into small groups assigned with a coordinator who is nominated and elected by the participants. These phases cement the critical values of PAR of improving social cohesion and unity during research and social inquiries; hence PAR serves as the primary vehicle of conducting this research.

Purposive sample was employed whereby fifteen (15) co-researchers were sampled to obtain qualitative data informed by the invaluable insights of experts. Demographics and gender representation were observed to ensure the diversity of perspectives; five (5) African male teachers of Mathematics teachers were taken into account. In addition, two (2) female mixed race English teachers in FET were included in the sample. Subsequently, three (3) female European teachers of subject advisers for both Mathematics and English EFAL, and five (5) female African learners were sampled to contribute to achieving the research aim and objectives of the study. A qualitative

method was employed whereby interviews were conducted and recorded, after which these were transcribed. Critical discourse analysis was employed whereby written and spoken words were analysed to develop themes of divergence and similarity. In addition, pseudonyms were used to conceal the identity of the co-researchers and maintain confidentiality.

Themes were developed according to phases, beginning with the table of indexes of ratings about the use of English as medium of instruction. Furthermore, knowledge was determined by contrasting and comparing the effects of indigenous games on the development of pedagogical content. When analysing data, pseudonyms were used to conceal the identity of participants.

4. Results Analysis and Discussion

This section intends to extrapolate the results and to interpret these results in line with the research aim. The paper aims to analyse and illustrate the effectiveness of EMI with respect to teaching Mathematics. The research question aids the interpretation of results. Moreover, the thematic assertions are categorised as follows: a) EMI as pedagogical strategy and/or approach of Mathematics, b) Internationalisation and competitiveness, c) Fostering conceptualisation and mastery, d) Cultural and linguistic lessons, and e) language barriers.

During the first phase of the interviews (planning), participants filled out the questionnaires which aimed to record the rating levels of satisfaction with the use of English as medium of instruction. These ratings ranged from 1-10 where 1-5 entails indicators of extremely unsatisfied to moderately satisfied. Furthermore, ratings of 5-10 indicate moderately satisfied to extremely satisfied. The following depictions (Figure 1) are illustrated to indicate the pattern of correlations:

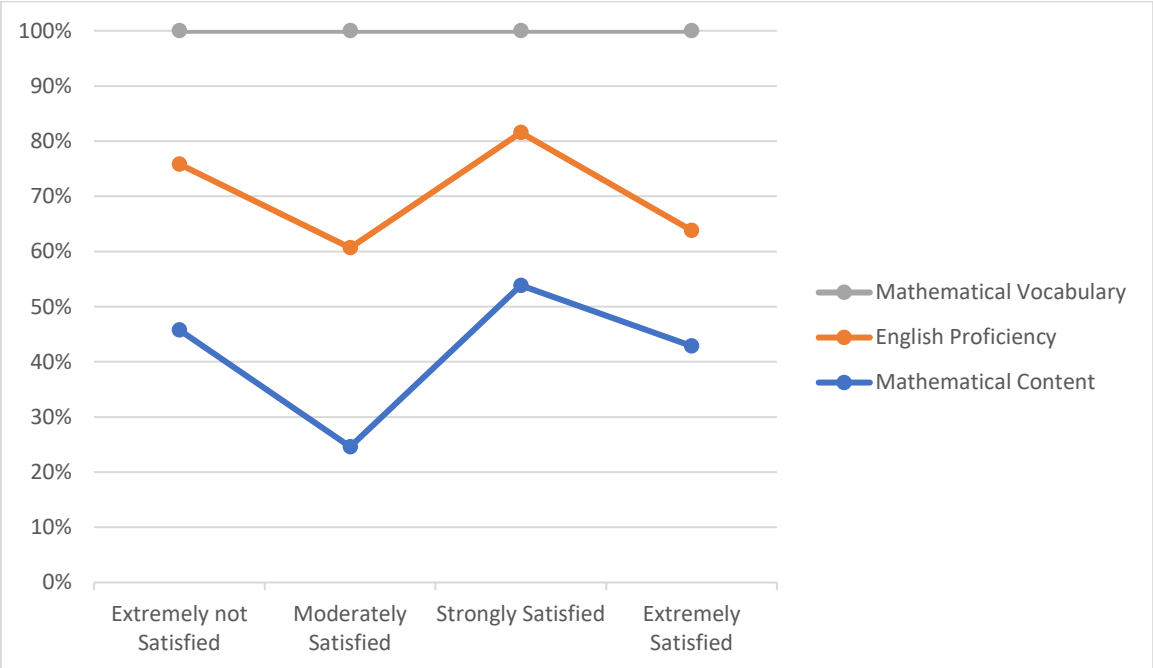

Figure 1. Indexes of using English as Medium of Instruction

The indexes from Figure 1 depict fluctuating levels of ratings with respect to participants' satisfaction levels about Mathematical content and English proficiency. The majority, namely 75-80%, of the participants indicated high levels of satisfaction with their English proficiency. In contrast, 45-50% reported gradually increasing levels of satisfaction with Mathematical content in terms of the curriculum of Mathematics, critical aspects and themes covered as the scope of teaching and learning.

However, 25-30% of participants indicated they were moderately satisfied in relation to Mathematical content. This rating can possibly be attributed to the fact that English as medium of instruction is implemented at the lower levels. Critical skills of English second language are not initially prioritised in terms of learners' linguistic competencies and proficiencies. A further 50-55% expressed their satisfaction that the basics of imparting English language skills are covered to the extent that language skills appear to coordinate with Mathematical content.

It appears that in respect of Mathematical vocabulary there is no significant difference or change influenced by the two factors, namely Mathematical content and English proficiency. This index accounts for various probabilities ranging from, on the one hand, the emphasis of Mathematical vocabulary in a classroom setting which aids the learning comprehension of critical aspect. On the other hand, it highlights the fact that learners are exposed to adequate language proficiency in English; as a result, their Mathematical performances vary according to both their Mathematical and English skills.

To be more precise, further themes reveal varied nuances with respect to Mathematic content teaching. Although Mathematic teachers have not had the opportunity to acquire EMI, they are nevertheless better equipped to explain and interpret concepts and terminologies of Mathematics. Therefore, pedagogical content knowledge is enhanced as depicted in the following excerpt:
Principal researcher: What are the benefits of teaching Mathematics using English as medium of instruction (EMI)?
Ms. Green: Both teachers and learners have equal opportunity not only to learn the Mathematic content but English as well. Because English is not our mother tongue, we enjoy learning it through the content of Mathematics.

The above excerpt indicates the extent and impact of EMI when teaching Mathematics. Both teachers and learners have equal opportunities of experiencing not only the Mathematics content learning but also the acquisition of English as a second language (ESL). This implies that the conceptualisation and mastery of Mathematics content is enhanced by the use of EMI. However, are conceptualisation and mastery of content crucial for the purposes of learning both Mathematics and English? This could well be the case as language learning is at the centre of learning Mathematic content and is essential for the conceptualisation and mastery of Mathematics content. Therefore, the reasoned nuance deduced from this analysis is that pedagogical content knowledge (PCK) is acquired and attained once the proficiency rate of both teachers and learners' English is standardised.

In the light of PCK predominance, the efficiency of applying these approaches and strategies of teaching Mathematics is reliant upon the indigenous knowledge system (IKS). IKS endows a plethora of prerequisites skills sufficient for Mathematics. To demonstrate that IKS harnesses PCK for Mathematics, the following excerpt attests to this premise:
Ms. Calculus: Look, we did not understand that huts in our yards, patios in the fields and different designs used to decorate these huts are discipline of Mathematics. However, ever since we understood the root words of Ethnomathematics, we came to realised that we forever lived and breathed Mathematics.

This expression underpins the essential view that IKS has developed and evolved over time, from the PCK from the era of rural ecologies up until the modern age. This realisation emphasises that it is difficult to conceptualise Mathematics' content without proper foundation of teaching Mathematic vocabulary. To avoid further confusion, the new words relating to Mathematics should be explained in a manner which fosters both learning and content knowledge; as such, PCK is not only attained but expands the vocabulary of both learners and teachers.

Despite this affirmation that PCK is attributed to IKS, the results indicate the relationship between Mathematics and EMI. The themes of cultural and linguistic lessons dispense valuable insights

about language, culture and Mathematics and have the potency to harness learning and understanding of Mathematics. Evidently, indigenous games such as a board game (*morabaraba*) and *magave* or *diketo* with their elements of ethnomathematics as a sub-discipline have a significant impact on both problem solving and conceptualisation. The following testimony endorses this extrapolation:

Maxwel: I have taught Mathematics over fifteen years (15) but only realised that board game and magave, which we used to play as kids can assist learners to understand Mathematics when solving. It further reinforces English acquisition because you need to understand and know morabaraba and diketo terminologies in English.

This assertion accentuates that cultural and linguistic lessons have the potential to enhance comprehension of Mathematics content and enable ESL acquisition. In the above-mentioned excerpt, the teacher had to find the meaning of *morabaraba and diketo* in English before directly applying their use as a strategy for problem solving in Mathematics. As a result, the task to explain the meaning of these games and their pedagogical application has probable effects to contribute towards the epistemology of Mathematics and English as a second language. Therefore, the efforts to balance language acquisition and the learning of Mathematics are dependent on language comprehension as far as EMI is concerned. Moreover, learning Mathematics is a game and understanding the language of Mathematics is the skill of playing the game. Learning Mathematics through indigenous games creates versatile minds and an enthusiasm for learning Mathematics. Moreover, learners who are linguistically inclined use opportunities for learning mathematics in both a fun and educative way.

Insomuch as the language of Mathematics is concerned, ESL play interlocutory functions of (a) producing learners with high levels of proficiency in English and (b) equipping learners with Mathematical vocabulary and linguistic fluency. Meanwhile, the probability of learners succeeding in both Mathematics and English as a subject and language far outweighs the multiplicity of challenges. The former exposes learners to international platforms such as enrolment in international universities for doctoral programmes with specialisation in Mathematics, while the latter affords the learners the international opportunity to participate in competitions such as the Mathematics Olympiad. These achievements present the classical confluence of how Mathematics as a subject matter and English as second language contribute to the scholarship of teaching and learning Mathematics.

Ms. Yellow Bone: My former and current learners have participated in various competitions such as Maths Olympiad since I have been using explicit instructions as an example of vocabulary strategy for teaching Mathematics.

Ms. Ross: My brother, I always say if our teachers taught us Mathematics the way I am teaching my learners using definitions and glossary, most definitely, many learners would have loved and passed Mathematics.

The absurdity of misconstruing concepts has ripple negative effects of mastering learning and attaining comprehension. Although learning Mathematics is supposed to be fun and exciting, the antithesis of the aspired enthusiasm and vibrancy are circumvented by scarcity of explicating terminologies and concepts. These concepts are structured in English and have causal link of distortion. Teachers bear the responsibility to explain these concepts in a relatively simple, concise and easy way. In light of this view, distortion and semantic dissonance can be averted if, for an example, definitions such as *equilateral* (all four sides are equal) can be provided using definitions and glossary at the beginning of the lesson. This vocabulary strategy triggers attention, retains and sustains it via interactive teaching and learning. In this way learning the content of Mathematics and ESL is integrated and achieved.

Even though the results manifest a random picture of successes of EMI on teaching Mathematics, they do, however, indicate the challenges of FET Mathematics to intentionally juxtapose the successes of EMI in relation to FET Mathematics on the basis of LOLT. Thus, it is found that English is predominately a LOLT or simply put, EMI, and as such, the majority of Africans have English as First Additional Language (EFAL). Therefore, they depend primarily on their vernacular to comprehend, conceptualise and interpret the terminology of Mathematics before the actual skill of problem solving. Therefore, the results indicate that EMI previously had a considerable impact on learning Mathematics. However, the use of EMI gradually mitigates the challenge of a language barrier. The following excerpt attests to this:

Mr. Basotho: Kids of today have the advantages of learned or educated parents who converse with their kids in English at homes, that thing assist a great deal when coming to learning subjects such as Mathematics.

Mr. Hutton: Many digital tools, manipulatives of Mathematics and teaching aids are compiled in English, these serve as the chance of our kids to have a better knowledge of both English and Mathematics.

These excerpts demonstrate the peculiarity presented by language barriers previously, and further posit that the trajectory of learning and teaching Mathematics has vastly and profoundly changed. Ever since learners have digital platforms, manipulatives and visual stimuli such as six blocks, the probability of learning English proportionally equates with the probability of learning Mathematics insofar as learning is concerned. In addition, a learner who has an educated parent(s) who does not only use English for the purposes of academic register and internalising concepts but further uses it for social interaction to reinforce language learning, has an additional opportunity to master Mathematics content because of language proficiency. In brief, the challenge of English as a language barrier diminishes insofar as FET Mathematics learning and teaching is concerned. Inversely, the language of Mathematics which is English across the board is integrated into the process of learning problem solving by and large.

As indicated, the challenges of FET Mathematics are varied and multiple in form and numbers. However, the purpose of this paper is essentially concerned with evaluating the challenge(s) that confine and present English as a language barrier, hence; for the purpose and scope of this paper, English as a language barrier is identified as the miniscule impediment overestimated for learning and teaching Mathematics. Consequently, the following Table 1 of derivatives of themes tabulates the core themes in conjunction with new nuances developed from results:

Table 1: Derivatives of Themes

Themes	Nuance
1. Pedagogical Content Knowledge (PCK)	EMI endowed by IKS and ethnomathematics enhances further PCK
2. Internationalisation and competitiveness	EMI improves results, performance and reputation of learners in Mathematics
3. Linguistic and cultural lessons	IKS and ethnomathematics sustain the use of EMI for learning and teaching Mathematics

This table indicates that IKS and ethnomathematics are crucial for the purposes of learning both Mathematics as a critical subject and English as a second language. This posits that insofar as learning Mathematics is concerned, both teachers and learners have to appreciate and embrace the fundamental significances of IKS and ethnomathematics in their lives, and apply the implication of these practices to learning Mathematics. In turn, the satisfaction derived from the comprehension of IKS invokes the curiosity of problem solving in any of disciplines or topics of Mathematics and accompanies such comprehension with the ability to know ESL and attain conceptualisation. This will generate the skill of problem solving from the theory of practice

resulting in what could be an indigenous teacher. The indigenous teacher is someone who has the ability to teach specific subject matter applying natural experiences and knowledge of reality in theory. Hence, the indigenous teacher has the ability to balance the teaching and learning of Mathematics with the teaching and learning of English as second language.

Apart from the existence of IKS and ethnomathematics, English is a universal language which does not only require proficiency and fluency but rudimentary skills and the art of teaching a critical subject such as Mathematics in English without subjecting learners to further cognitive dissonance. Similarly, IKS and ethnomathematics refine PCK and its application to be more pragmatic instead of abstract, confirming that PCK is formed through experiences and knowledge acquired from practices and lived experiences which expose learners to paradigm shift and impart relevant learning styles.

It is necessary to discern the correlational effects of indigenous games on the development of pedagogical content knowledge, bearing in mind that the most crucial principles deduced from these games are binary cues, permutation and geometrical patterns. The following Figure 2 illustrates the inherent relationship evolved from the integration of the IKS and PCK:

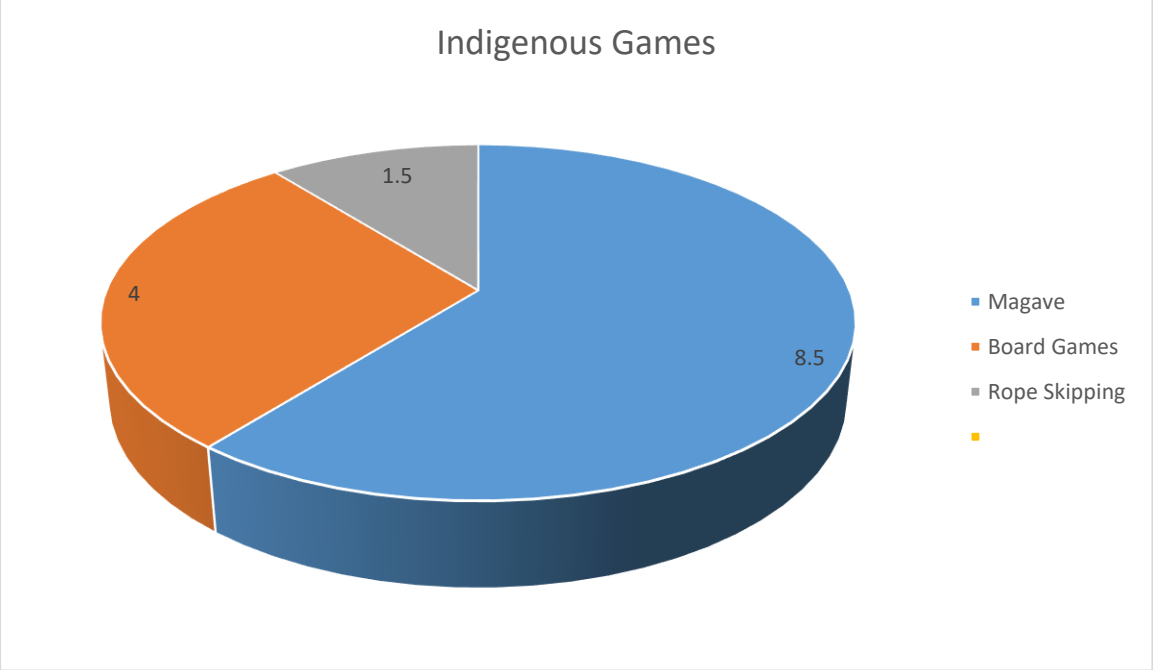

Figure 2: Correlational Effects between Indigenous Games and Pedagogical Content

Among the fifteen participants, 60% of participants preferred *magave* (*diketo*) because it provides different rhythmic tones that assist with addition, division and subtraction. These are crucial rudimentary principles of Mathematics which aid learners' conceptualisation of Mathematics. It further harnesses learners' knowledge about the concepts of time, patience and critical thinking. Conversely, 26% of participants preferred a board game (*morabaraba)* over *magave.* Although similar principles are deduced from these two games, the core reasons for the preference of *magave* over the other are (a) the majority of participants were female teachers and learners; (b) as such, the technique and skills of playing board games might be average compared to their male counterparts, and lastly, (c) lack of exposure or orientation to learning the skills, tactic and rules of playing this board game.

Notwithstanding these axioms, it transcends conventional-traditional approaches of teaching Mathematics as these indigenous games expose learners to experiential learning. It is noteworthy to mention that Mathematics potentially shapes and moulds life experiences; therefore, the

approach of indigenous games impacts learners' learning styles and abilities, and codifies core principles essential for pedagogical content knowledge. Furthermore, a marginal digit rather than a percentage of 13% preferred rope skipping. The implications of this preference are that (a) rope skipping requires an athletic technique of jumping which is embedded in the equilibrium abilities of learners; as such, the majority of participants were not athletically inclined and (b) owing to the majority of participants being females, faced with the choice between rope skipping or *magave*, the majority opted for the latter instead of the former.

The facets of learning Mathematics using EMI are complex and complicated; however, the advantage of using EMI levels the playing fields and stimulates the intellectual discourse of what informs the distinction between the language of Mathematics and ESL. As stated, EMI is the pertinent tenet which appraises learners' performances and is coupled with the rationale that EMI does not only enhance performances but affords them international platforms and active participation in competitions such as Trends in International Mathematics and Science Study (TIMSS) and the Olympiad, among others. The sound reasons associated with EMI are proficiency, language learning and vocabulary expansion, among other attributes. On the other hand, these reasons are dialectical because the instructional design, assessment and evaluation of Mathematics are in English and EMI dispenses both linguistic and Mathematical skills.

The concept of problem solving is intricate and infused with understanding, not only the source but the nature of the problem for an accurate choice of methods. Similarly, learning problem solving in Mathematics requires an understanding of its language, namely the vocabulary of Mathematics. Therefore, the cultural and linguistic lessons drawn from IKS and ethnomathematics have a direct bearing on the epistemological process of teaching and learning Mathematics. The vast benefits of cultural and linguistic lessons equip teachers and learners equally to conceptualise, retain and sustain learning through the interpretation of various methods, patterns, shapes and strategies extricated from IKS and ethnomathematics. To be precise, the ancient adage of six feet which has elements of indigenous knowledge and measurements, applies during the measuring and digging of a grave. This duality of meaning that infers a) the size of the grave in terms of width, breadth and length, and b) the conviction that the departed one is not crossing into another world. Therefore, the credible interpretation and application of these meanings depict not only the level of cognition but also the level of comprehension of language.

5. Conclusion and Recommendation

The paper aimed to evaluate the effects of EMI for FET Mathematics content teachers. The research question facilitated and guided the generation, analysis and interpretation of data. Retrospectively, data analysis established varied themes as expressed by objectives. The use of EMI for FET Mathematics content teachers far outweighs the impediments or challenges of EMI for content subjects. What is significant about Mathematics is that this is the subject endowed with the ethos of life which necessitates applying experiential learning to solving Mathematics problems. Despite this necessity, English is the LOLT for Mathematics and the acquisition of English as second language aids the learning and mastery of concepts for Mathematics. In addition, the IKS cultural and linguistic lessons and ethnomathematics facilitate the process of acquiring pedagogical content knowledge for Mathematics. The pivotal role of language of English serves as the cornerstone for acquiring PCK for Mathematics. Irrespective of whether either the teacher or learner is proficient, the results indicate the necessity of EMI as the teaching pedagogy for Mathematics.

Additionally, one of the burning issues is the development of Mathematics content in African languages. This proposition owes allegiance to the traditional perspective that Mathematics originated in Africa; therefore, the language of instruction for learning Mathematics must resonate

with the Afrocentric intimations and perspectives to better understand and apply the theory of practice informed by our natural experiences and indigenous knowledge. The contention that Mathematics cannot evolve to incorporate Afrocentric pedagogy is no longer credible but justifies research output with respect to decolonising Mathematics curricula in particular and other critical subjects in general.

Notwithstanding these attributes, the paper manifests a number of successes pertaining to EMI in Mathematics classroom. The miniscule challenge of English as a learning barrier is evaluated to the extent that it satisfies the research aim; hence, further research is required to determine the impediments or risks of using EMI to teach Mathematics. Succinctly, EMI promotes the self-esteem of both teachers and learners. It further guarantees the learners an international spot for participation in any shape and form. Nevertheless, research must be undertaken to understand the significant value of these competitions and international platforms for teachers.
The following are the recommendations which could be considered for future studies:

1. The current study limited itself to the success of EMI. Therefore, future studies should explore the possibility of using African languages for teaching Mathematics.
2. Although the paper aimed to evaluate the efficacies of English medium of instruction for FET Mathematics content teachers, further research is required to synthesize mechanisms of decolonising curricula for teaching Mathematics in African dialects.
3. The vocabulary strategy for content subjects appeared to be the fundamental challenge; therefore, future studies should evaluate how vocabulary impedes the success of teaching Mathematics in English.
4. Policy and curriculum development must be prioritised to withstand the modern challenges of teaching Mathematics in a foreign language and to revolutionise curricula to reflect different linguistic and cultural themes, permutations and axioms of Mathematics.

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