



Post Covid-19: Exploring the decolonisation factor in a Mathematics classroom in South African schools

Nozuko Nqabeni¹ and Andrea Mqondiso Buka¹

¹ Department of Continuing Professional Teacher Development, Faculty of Educational Sciences, Walter Sisulu University, South Africa.

ABSTRACT

In all its efforts, the current South African regime advocates equal and quality education with its educational reforms in particular. However, adapting the curriculum for the previously oppressed in the classroom as the language of the colonist still dominates post the Covid-19 pandemic. It is imperative that Africanisation of the curriculum could be effectively implemented especially in Mathematics classes since the subject is viewed as a scarce skill. Currently, reports indicate that learners are performing poorly in languages and Mathematics. In this theoretical paper, the authors argue that if strategies addressing teaching beyond Covid-19 are embedded in principles of decolonisation and Africanisation are properly addressed in the teaching and learning of Mathematics, the above gloomy picture can be changed for the better. In that process, aspects and issues that can be barriers to learners, namely, the background culture of the learner, language and socio-economic factors need to be addressed. To effect this in the classroom, meaningful Mathematics teaching and learning in this era post covid-19, the authors believe and advocate that constructivist theory can be of benefit. This theory incorporates community and school ecosystems, which can engage various stakeholders in the development of Mathematics learners. This paper posits that within the constructivist theory, teachers will be employing both their Mathematics content knowledge (MCK) and pedagogical content knowledge (PCK) in teaching to advance decolonisation and Africanisation of curriculum.

Correspondence
Nozuko Nqabeni
Email: nnqabeni@wsu.ac.za

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INTRODUCTION

The global spread of the COVID-19 epidemic has made the educational environment more challenging. The COVID-19-related uncertainty, concern and anxiety had an equal impact on teaching and learning. According to the World Health Organization, this pandemic is the deadliest in recorded history.¹ The South African educational system appears to struggle with delivering results that are appropriate for each learner, as evidenced by the foundation phase (FP) to further education and

¹ World Health Organization, “Coronavirus Disease (COVID-19),” accessed October 26, 2022, <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>.

training (FET) bands, according to the Department of Basic Education.² The upshot is that South African schools have been dubbed among the worst in the world for mathematics instruction and learning.

Although it is a challenging and pressing topic, decolonising education in South Africa is not well understood. According to Jojo, many public school schoolchildren are turned away from acquiring university education, losing out on training in necessary skills for today's jobs because ineffective mathematics teaching techniques are not acknowledged.³ The teaching and learning environment must be completely transformed to meet the post-pandemic times if positive results are to be produced.⁴ According to Badat, since the start of democracy in South Africa in 1994, various governments have vowed to improve the nation's educational system.⁵ Subsequently, from that moment forward, these governments have made similar vows to change this sector. Despite significant changes to the South African mathematics (Math) curriculum, such as the growth of the math education research community, classroom mathematics remains difficult.⁶ The authors concur with Odora's argument, that to transform the post-apartheid educational system, the nation's fabric must be rebuilt while fully acknowledging the past.⁷ Additionally, new capacities in the areas of literacy, numeracy, critical thinking, conceptual imagination, and communication skills must be created to provide all South Africans with a high-quality education. One crucial component of this is raising quality by having a better understanding of the teaching and learning processes.

This calls for a thorough reassessment of the fundamental ideas underlying education, as well as a critique of colonial and apartheid pedagogy. Practices in education and management must put learners first, acknowledge and build on their knowledge and consider the background and environment of learners.⁸ The aforesaid writers continue by stating that to decolonise a mathematics classroom post Covid-19, a special emphasis should be placed on eradicating educational discrepancies among groups of people who have gone through significant challenges. This theoretical paper examines the decolonisation aspect in math teaching and learning post Covid-19, by investigating Afrocentric mathematics teaching methodologies in the classroom. The authors concur that it is important to incorporate teachers' current educational methods as well as their epistemological concepts, beliefs and opinions while using technology. This is one method via which change might occur.

² Department of Basic Education (DBE), "National Senior Certificate Examination Report 2018" (Pretoria, 2018); Department of Basic Education (DBE), "Report on the Annual National Assessment of 2014: Grades 1 to 6 and 9" (Pretoria: DBE, Republic of South Africa, 2014); David Mhlanga and Tankiso Moloi, "COVID-19 and the Digital Transformation of Education: What Are We Learning on 4IR in South Africa?," *Education Sciences* 10, no. 7 (July 9, 2020): 180, <https://doi.org/10.3390/educsci10070180>; Ursula Kate Hoadley, "A Review of the Research Literature on Teaching and Learning in the Foundation Phase in South Africa," 2016.

³ Zingiswa Jojo, "Mathematics Education System in South Africa," in *Education Systems Around the World* (IntechOpen, 2020), <https://doi.org/10.5772/intechopen.85325>.

⁴ Margaret Burchinal et al., *Early Language Outshines Other Predictors of Academic and Social Trajectories in Elementary School*, 2016.

⁵ Saleem Badat, *Trepidation, Longing, and Belonging: Liberating the Curriculum at Universities in South Africa*, 2017, <https://doi.org/10.13140/RG.2.2.31255.57765>.

⁶ M. Qetelo. Moloi, "Mathematics Achievement in South Africa: A Comparison of the Official Curriculum with Pupil Performance in the SACMEQ II Project-," in *Southern and Eastern Africa Consortium for Monitoring*, 2012, 1–27, [http://www.sacmeq.org/sites/default/files/sacmeq/research/Papers from the 2005 International Invitational Educational Policy Research Conference/moloi.pdf](http://www.sacmeq.org/sites/default/files/sacmeq/research/Papers%20from%20the%202005%20International%20Invitational%20Educational%20Policy%20Research%20Conference/moloi.pdf).

⁷ Catherine Odora, "Transformation and Change in Knowledge Generation Paradigms in the African and Global Contexts: Implications for Education Research in the 21st Century," *Educational Research for Social Change* 6, no. 1 (2017): 1–11, <https://doi.org/10.17159/2221-4070/2017/v6i1a1>.

⁸ Amiena Bayat, Wynand Louw and Ravinder Rena, "The Impact of Socio-Economic Factors on the Performance of Selected High School Learners in the Western Cape Province, South Africa," *Journal of Human Ecology* 45, no. 3 (March 24, 2014): 183–96, <https://doi.org/10.1080/09709274.2014.11906692>.

DECOLONISATION OF EDUCATION IN SOUTH AFRICA

The decolonisation of education has become a contentious topic in numerous African countries in recent years, including South Africa.⁹ Africa is diligently looking for ways to reorganize and decolonise knowledge while following global trends. The authors agree with Msila's claims that without a serious and in-depth investigation of how education in South Africa can be fundamentally restructured to make it relevant to African concerns, the significance of the country's cultural ideas, knowledge, and values cannot be fully appreciated.¹⁰ This creates a barrier for all Africans who want to decolonise knowledge in terms of education. Spaul argues that this educational issue is not difficult to understand given that a society's values, cultural norms, and ideas are mostly passed down through education.¹¹ While learning is a personal experience, Backus argues that it is also stimulated and experienced through social contact.¹² Therefore, it makes sense that the pedagogical process and learning outcome may be negatively influenced when unequal social conditions prevail, as they do in most postcolonial cultures today.¹³ On the other side, the authors explained how inaccurate conditions might hinder implicit learning, which is the knowledge that is ingrained into culture. Some habits and learning outcomes may therefore be lost or unlearned in poor educational environments. Wessels contends that decolonising mathematics classrooms in South Africa is a problem that has to be addressed but is also underemphasized, despite the fact that the current atmosphere looks to be hindering learners' capacity to successfully grasp a subject. Learning methods are also idiosyncratic on a societal and an individual level since culture distinguishes between cognitive and social human features.¹⁴

As socially transmitted knowledge, culture is assumed to be embedded in the human brain.¹⁵ The social environment is a significant contributor to pedagogy since settings govern the types of social interactions that people engage in, such as teaching and learning in the context of education. The decolonisation of mathematics education in South African schools is, however, necessary due to several variables, including the socioeconomic status of the learners and the degree of pedagogical subject expertise possessed by their teachers.¹⁶

Addressing the Background Culture of the Learners

One of the most important aspects of decolonising classroom mathematics is making sure that all learners, irrespective of socioeconomic status, race, gender, physical or intellectual ability, are provided with the knowledge, skills, and values essential for self-fulfilment and eloquent involvement in humanity as citizens of a democratic country. According to D'Ambrosio, every schoolchild needs to be educated so that they may easily enter higher education.¹⁷ This would facilitate their transition from educational institutions to the job and give companies a thorough picture of their competencies. It is crucial to keep in mind that schools are an integral component of the communities in which they

⁹ Jojo, "Mathematics Education System in South Africa"; A.M. Backus, *Learning, Class 2: Learning Theories (PowerPoint)*, 2016.

¹⁰ Vuyisile Msila, "Fostering Africanisation: A Lesson of Identity Formation among Youth," *Mediterranean Journal of Social Sciences* 5, no. 8 (May 1, 2014): 431–40, <https://doi.org/10.5901/mjss.2014.v5n8p431>.

¹¹ Nicholas Spaul, "South Africa's Education Crisis: The Quality of Education in South Africa 1994-2011," *Undefined*, (2013).

¹² Backus, *Learning, Class 2: Learning Theories (PowerPoint)*.

¹³ Spaul, "South Africa's Education Crisis: The Quality of Education in South Africa 1994-2011."

¹⁴ Nastassja Wessels, "Decolonization of Education in South Africa A Basic Education Problem.," <https://www.diggitmagazine.com/papers/decolonization-education-south-africa>, 2017.

¹⁵ Sumari O'Neil and Eileen Koekemoer, "Two Decades of Qualitative Research in Psychology, Industrial and Organisational Psychology and Human Resource Management within South Africa: A Critical Review," *SA Journal of Industrial Psychology* 42, no. 1 (April 22, 2016), <https://doi.org/10.4102/sajip.v42i1.1350>; Urie Bronfenbrenner and Pamela Morris, "The Ecology of Developmental Processes.," 1998.

¹⁶ Burchinal et al., *Early Language Outshines Other Predictors of Academic and Social Trajectories in Elementary School*.

¹⁷ Ubiratan D'Ambrosio, "What Is Ethnomathematics, and How Can It Help Children in Schools?," *Teaching Children Mathematics* 7, no. 6 (2001): 308–10.

are located. The schools' job is to either encourage or discourage the socialization of injustice. The school is a dependent sector of society that has the potential to spread alienated perceptions. In addition, it acts as a scene of conflict where attentive educators can challenge inequity in a democratic educational process employing a challenging curriculum.¹⁸

Teachers' constrained pedagogy was established in schools under the post-apartheid socioeconomic education system. According to Duze and Ogbah, this system aims to forge an innovative South African character through transforming fundamental knowledge, transforming South African society, promoting fairness, and amplifying the active participation of learners in education.¹⁹ To create this democratic, egalitarian, and interdependent society, both teachers and learners must be exposed to a system that values democracy.²⁰ According to the aforementioned author, this strategy emphasizes a child's own biology as the major microenvironment that provides the child with the stimulus for development. Because it gives citizens the power to exercise their democratic rights and control their future, education is crucial.²¹ People who have a democratic education are also better prepared to participate in society, think critically, and behave ethically.

Mathematics in Indigenous Knowledge Systems

By acknowledging this nation's rich history and legacy, classroom mathematics has contributed to the value of indigenous knowledge systems.²² In indigenous knowledge systems, mathematics is seen as a crucial factor in fostering the ideals outlined in the Constitution. This is done through credibility, quality and efficiency by offering an education that is comparable in quality, breadth and depth to that of other nations.²³

According to Hoadley, learning mathematics in the classroom enables students to effectively collaborate with others as team members and work both alone and together to identify problems, solve them and come to choices utilizing critical and creative thinking.²⁴ Students can manage themselves and their activities properly and successfully by organizing themselves through classroom mathematics.²⁵ In order to effectively interact with their classmates utilizing multiple forms of visual, symbolic and/or linguistic abilities, learners must be able to gather, analyse, organize and critically evaluate information.²⁶ With this understanding, students might be able to use science and technology effectively and critically while also taking care of the health of others and the environment. According to King, when teachers instruct their students to decolonise classroom mathematics beyond the COVID-19 pandemic, their students will be able to show that they have a grasp of the world as a

¹⁸ Jojo, "Mathematics Education System in South Africa."

¹⁹ Chinelo O. Duze and Rosemary Ogbah, "Retaining and Developing Quality Teachers: Critical Issues for Administrators in Nigeria Secondary Schools," *Journal of Sociological Research* 4, no. 1 (February 23, 2013), <https://doi.org/10.5296/jsr.v4i1.3296>; Donald David, *Educational Psychology in Social Context: Ecosystemic Applications in Southern Africa*, ed. Sandy Lazarus and Nadeen Moolla, 5th ed. (Oxford: Oxford University Press, 2014).

²⁰ Bronfenbrenner and Morris, "The Ecology of Developmental Processes."

²¹ Dharmendra Kumar Yadav, "EXACT DEFINITION OF MATHEMATICS," *International Research Journal of Mathematics, Engineering and IT (IRJMEIT)* 4, no. 1 (January 2017): 34–42.

²² Erika Hoff, "Interpreting the Early Language Trajectories of Children from Low-SES and Language Minority Homes: Implications for Closing Achievement Gaps.," *Developmental Psychology* 49, no. 1 (2013): 4–14, <https://doi.org/10.1037/a0027238>; Burchinal et al., *Early Language Outshines Other Predictors of Academic and Social Trajectories in Elementary School*.

²³ Meredith L. Rowe et al., "The Role of Parent Education and Parenting Knowledge in Children's Language and Literacy Skills among White, Black, and Latino Families," *Infant and Child Development* 25, no. 2 (March 2016): 198–220, <https://doi.org/10.1002/icd.1924>.

²⁴ Hoadley, "A Review of the Research Literature on Teaching and Learning in the Foundation Phase in South Africa."

²⁵ Yadav, "Exact Definition of Mathematics."

²⁶ Zalman Usiskin, "Beauty and Serendipity in Teaching Mathematics," *Journal of the International Society for Design and Development in Education*, no. 12 (March 2019), <https://www.educationaldesigner.org/ed/volume3/issue12/article47/>.

collection of interconnected systems by realizing that problem-solving contexts do not exist in a vacuum.²⁷

According to Landsberg, Kruger and Swart, who concur with the aforementioned author, inclusion should be a key component of school organization, planning and instruction.²⁸ This is only possible if all teachers possess a thorough understanding of how to identify and remove learning obstacles as well as how to plan for diversity. The cited authors assert that the key to the management of inclusivity is making sure that learning barriers are identified and addressed by relevant support groups within the school community, including teachers, district-based support teams, institutional-level support teams, parents and special schools serving as resource centres. Teachers should use a variety of curriculum differentiation strategies, according to Van Steenbrugge et. al., to attend to learners experiencing learning barriers in the classroom. These strategies are included in the department of Basic Education's Guidelines for Inclusive Teaching and Learning.²⁹

Language and Socio-Economic Status Factors

Making sure that the educational inequities of the past are corrected and that equitable educational opportunities are offered for all segments of the population is one of the key components of social transformation.³⁰ In addition, high knowledge and high skills are required at each grade and the minimum criteria are established and set high with achievable levels in all areas. This promotes active and critical learning rather than the memorized and passive learning of predetermined truths.³¹ The content and context of each grade in the mathematics classroom move from simple to advanced.³² By incorporating the values and practices of social and environmental justice as well as human rights as outlined in the nation's constitution, socioeconomic status incorporates knowledge of human rights, inclusion and justice for everyone.³³ These are referred to as the most sensitive issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors.

A person's entire social standing, which is influenced by their accomplishments in both the social and economic spheres, is known as their socio-economic status (SES).³⁴ The SES of the parents or family is referred to when discussing studies on children's academic attainment. The socio-economic position of a person is based on their educational accomplishments, employment and occupational status, as well as their income and wealth. A key component of social change and economic development has been thought to be high-quality education. Therefore, it is stated that the teaching and learning process has been viewed as dependent on educational quality and progress. But since democracy was established, there have been more complaints voiced about the status of education in South Africa. According to Spaul, the lasting effects of apartheid and the ensuing relationship between wealth and education have led to an overall decline in academic performance among pupils from lower

²⁷ Abby King, "Methods of Teaching Mathematics in Primary School | Sciencing," 2017, <https://sciencing.com/methods-of-teaching-mathematics-in-primary-school-12745838.html>.

²⁸ Emmerentia Landsberg, Deirdré Krüger, and Estelle Swart, *Addressing Barriers to Learning. A South African Perspective*, 3rd ed. (Van Schaik Publisher, 2016).

²⁹ H. Van Steenbrugge et al., "Preservice Elementary School Teachers' Knowledge of Fractions: A Mirror of Students' Knowledge?," *Journal of Curriculum Studies* 46, no. 1 (January 2, 2014): 138–61, <https://doi.org/10.1080/00220272.2013.839003>.

³⁰ Bayat, Louw and Rena, "The Impact of Socio-Economic Factors on the Performance of Selected High School Learners in the Western Cape Province, South Africa."

³¹ Jessica F. Schwab and Casey Lew-Williams, "Language Learning, Socioeconomic Status, and Child-Directed Speech," *Wiley Interdisciplinary Reviews: Cognitive Science* 7, no. 4 (July 2016): 264–75, <https://doi.org/10.1002/wcs.1393>.

³² Ismail Ozgur Zembat, "Conceptual Development of Prospective Elementary Teachers: The Case of Division of Fractions" (The Pennsylvania State University, 2004), https://etda.libraries.psu.edu/files/final_submissions/2428.

³³ Jessica L. Montag, Michael N. Jones and Linda B. Smith, "The Words Children Hear," *Psychological Science* 26, no. 9 (September 4, 2015): 1489–96, <https://doi.org/10.1177/0956797615594361>.

³⁴ Bayat, Louw and Rena, "The Impact of Socio-Economic Factors on the Performance of Selected High School Learners in the Western Cape Province, South Africa."

socioeconomic backgrounds.³⁵ One of the most accurate indicators of future academic success and preparation for school is language skills in early childhood.³⁶

Over the course of their development, children learn more when their parents communicate with them and language development is likely to be particularly shaped in the early years of childhood.³⁷ However, given that there are variations within SES groups, it appears that there are large group disparities in the language input of parents and the language acquisition of children across the SES spectrum.³⁸ But by the time they start school, many children from lower socioeconomic status (SES) homes perform noticeably poorer than their classmates on standardized assessments of language comprehension and fluency.³⁹ It has been observed that parents of professional households communicate with their children substantially more frequently than parents of working-class and low-income families. Additionally, Schwab and Lew-Williams assert that SES disparities had significant effects on children's language development because talkativeness relates to learners' vocabulary development.⁴⁰ Literature subsequently demonstrates that SES inequalities occur in both spontaneous speech and book reading, which may have an impact on children's vocabulary growth.⁴¹

There are also variations in the quality of parental input between social classes, in addition to variations in parental input quantity. As a result, it has been observed that children in professional-class families generally hear much more words of encouragement and fewer words of discouragement than children in low-income families.⁴² The authors recently examined how differences in children's language development are related to differences in both the quantity and quality of parental contact with them over a wide range of SES.⁴³ One of the quality markers for parents is their use of a range of words, and in addition to comparing parental input volumes between social classes, differences in input quality were also looked at.

Conceptual Framework of the Study

Since concepts, empirical research, and significant theories are used to organize the knowledge espoused by the researcher, conceptual framework refers to the integrated way of looking at the problem explored by relating the connection between the main concepts of the study and the specific exploration through concepts.⁴⁴ Adom, Hussein and Agyem, define a conceptual framework as a form of model that uses illustrations or diagrams to illustrate how variables, particularly independent and dependent variables, are related to one another. These include socio-economic factors such as the educational level of parents for such learners, occupation of the learner's parents, their income level, learner character and socialisation, teacher character/motivation, parental attitude and family size/status. These factors have a massive contribution to every learner's performance and academic achievement. The cultural factors that may influence academic achievement include teenage pregnancy, early marriages, gender discrimination, broken families and child-headed households.⁴⁵ It is believed that the criterion variable, which is learners' competence in a mathematics classroom, can

³⁵ Spaul, "South Africa's Education Crisis: The Quality of Education in South Africa 1994-2011."

³⁶ Hoff, "Interpreting the Early Language Trajectories of Children from Low-SES and Language Minority Homes: Implications for Closing Achievement Gaps.;" Burchinal et al., *Early Language Outshines Other Predictors of Academic and Social Trajectories in Elementary School*.

³⁷ Schwab and Lew-Williams, "Language Learning, Socioeconomic Status, and Child-Directed Speech."

³⁸ Montag, Jones and Smith, "The Words Children Hear."

³⁹ Hoff, "Interpreting the Early Language Trajectories of Children from Low-SES and Language Minority Homes: Implications for Closing Achievement Gaps."

⁴⁰ Schwab and Lew-Williams, "Language Learning, Socioeconomic Status, and Child-Directed Speech."

⁴¹ Schwab and Lew-Williams, "Language Learning, Socioeconomic Status, and Child-Directed Speech."

⁴² Rowe et al., "The Role of Parent Education and Parenting Knowledge...."

⁴³ Rowe et al., "The Role of Parent Education and Parenting Knowledge...."

⁴⁴ O'Neil and Koekemoer, "Two Decades of Qualitative Research in Psychology, Industrial and Organisational Psychology and Human Resource Management within South Africa: A Critical Review."

⁴⁵ Dickson Adom, Emad Hussein, and Joe Adu-Agyem, "Theoretical and Conceptual Framework: Mandatory Ingredients of a Quality Research," *International Journal of Scientific Research* 7 (January 2, 2018): 438-41.

be anticipated by examining the socioeconomic aspects mentioned.⁴⁶ However, levels of accomplishment can be reduced through state regulations, advice and counselling. Both the independent factors and the dependent variable are impacted by these intervening variables.

The conceptual framework that presents the interrelationship of the study variables is shown in Figure 1.

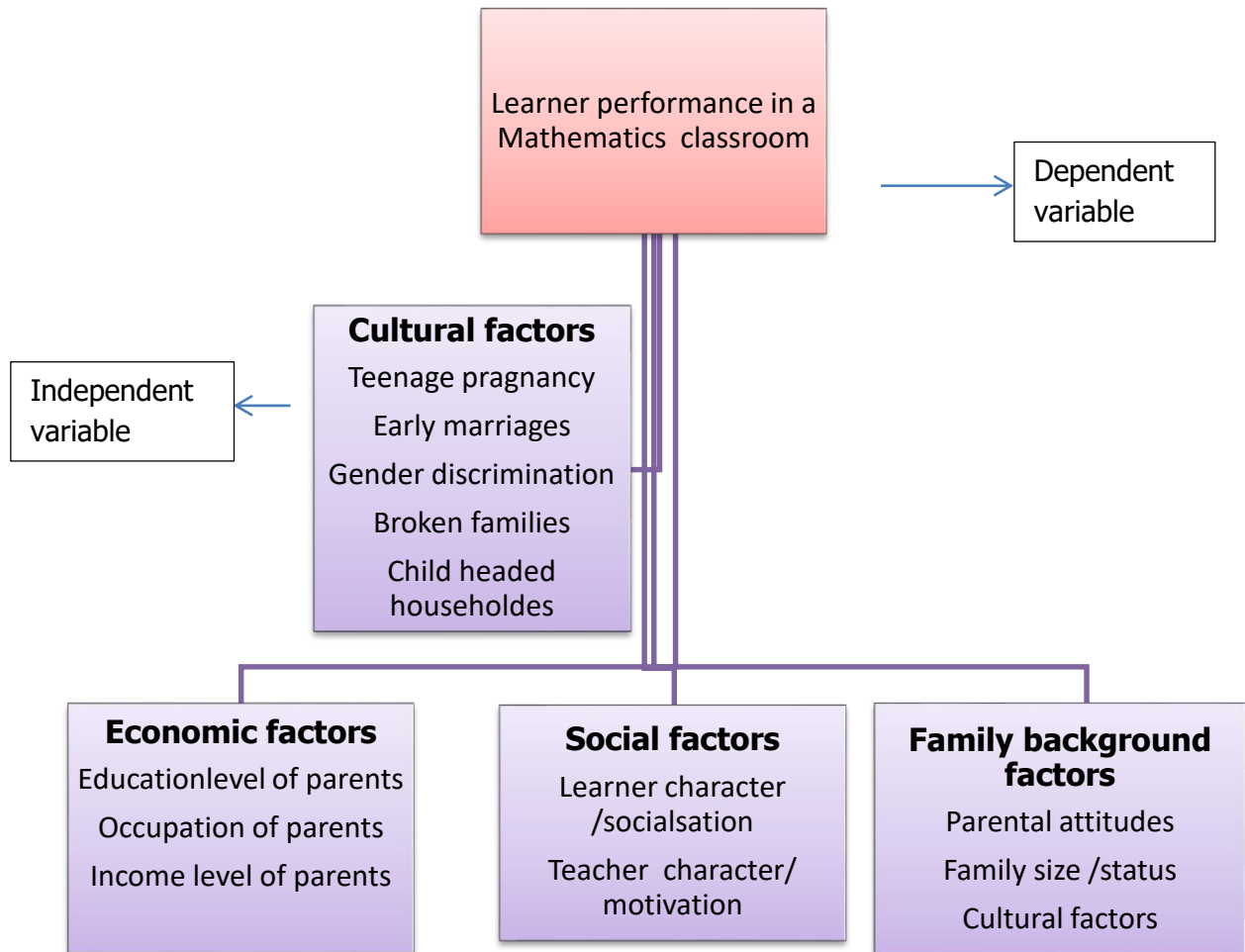


Figure 1: SES Factors influencing learner Performance in Mathematics classroom

From the figure, it can be observed that, this conceptual framework shows that various factors contribute to learners’ performance and acquisition of skills.⁴⁷

Collegiality in Transforming Mathematics Classes

In the quest to develop their pedagogy, teachers need to consider collaboration and collegiality. Shah avows that strong and healthy collegial relationship among teachers at school is regarded as an essential component of school effectiveness and teacher enhancement.⁴⁸ It has also been noted that the degree to which collegiality is valued among teachers can have a significant impact on the results and advantages of collaborative working and collegial culture in schools and universities. Organizational

⁴⁶ Montag, Jones, and Smith, “The Words Children Hear.”

⁴⁷ Schwab and Lew-Williams, “Language Learning, Socioeconomic Status, and Child-Directed Speech.”

⁴⁸ Madiha Shah, “The Importance and Benefits of Teacher Collegiality in Schools – A Literature Review,” *Procedia - Social and Behavioral Sciences* 46 (2012): 1242–46, <https://doi.org/10.1016/j.sbspro.2012.05.282>.

theory concepts that first appeared in the corporate sphere support the idea that teachers perform better when they collaborate professionally.⁴⁹ These views see genuine cooperation as a crucial element of a successful organization, with its members interacting frequently to share ideas and skills and create a shared comprehension of the organization's goals and the mechanisms to accomplish them.⁵⁰

Building a more effective collegial culture in schools is necessary as evidenced by the massive benefits of teacher collegiality. The most important advantages of workplace collegiality include the advancement in teacher professionalism, professional growth, and development,⁵¹ school quality and organizational effectiveness,⁵² and student behavior, attitude, and achievement.⁵³

The Mediation of Learning Resources

The absence of learning materials is another issue that impedes language development in low-SES families. A proven method for raising children's participation in language and literacy activities and eventually fostering language outcomes is to give children and their parents more and easier access to literacy resources. There is some proof that a single library visit significantly affects learners' reading experiences.⁵⁴ In an intervention, low-income second and third graders were given the opportunity to tour a public library and borrow 10 books, as opposed to their counterparts in the control group who were only permitted to borrow one book from the school library. In comparison to the control group, learners in the intervention group reported reading more and having a more favourable attitude toward reading.⁵⁵ Books and learning materials also make a difference in learners' language and literacy experiences in both classroom and home contexts.

Teachers' Pedagogical Knowledge

The understanding encompasses the integration of content and pedagogy into a comprehension of how specific topics, concerns or problems are organized, represented and tailored to the wide range of learner interests and abilities before being taught to others.⁵⁶ Additionally, pedagogical content knowledge (PCK) is the understanding of the techniques teachers employ to assist their learners to develop a deep understanding of the ideas they teach.⁵⁷ According to Woolfolk, effective teachers use their pedagogical knowledge and expertise to aid learners in comprehending complex ideas.⁵⁸ Furthermore, according to Park and Oliver, PCK is teachers' comprehension and illustration of how to

⁴⁹ Peter Clyde Martin, *Collaborative Practices Among Teachers to Serve Low-Achieving High School ESL Students*. (Proquest, Umi Dissertation Publishing, 2011), <https://www.amazon.ca/Collaborative-Practices-Teachers-Low-Achieving-Students/dp/1243485272>.

⁵⁰ Roland S. Barth, "Improving Relationships within the Schoolhouse.," *Educational Leadership* 63, no. 6 (March 2006): 8–13.

⁵¹ Lucy Jarzabkowski, "Teacher Collegiality in a Remote Australian School.," *Journal of Research in Rural Education* 18, no. 3 (2003): 139–44; John Retallick and Richard L Butt, "Professional Well-Being and Learning: A Study of Teacher-Peer Workplace Relationships," *The Journal of Educational Enquiry* 5 (2009): 85.

⁵² Barth, "Improving Relationships within the Schoolhouse.,"; Richard DuFour, "What Is a 'Professional Learning Community'?", *Educational Leadership* 61, no. 8 (2004): 6–11, <https://www.ascd.org/el/articles/what-is-a-professional-learning-community>.

⁵³ Ken Futernick, *A Possible Dream: Retaining California Teachers So All Students Learn* (California State University, 2007), <https://www.wested.org/resources/a-possible-dream-retaining-california-teachers-so-all-students-learn/>; Patti L. Chance and Susan N. Segura, "A Rural High School's Collaborative Approach to School Improvement.," *Journal of Research in Rural Education* 24, no. 5 (2009): 1–12.

⁵⁴ Bayat, Louw and Rena, "The Impact of Socio-Economic Factors on the Performance of Selected High School Learners in the Western Cape Province, South Africa."

⁵⁵ John Mark Froiland et al., "Neighbourhood Socioeconomic Well-Being, Home Literacy, and Early Literacy Skills of at-Risk Pre-Schoolers.," *Psychology in the Schools* 50, no. 8 (September 2013): 755–69, <https://doi.org/10.1002/pits.21711>.

⁵⁶ Vern I. Paulsen and Mrinal Raghupathi, *An Introduction to the Theory of Reproducing Kernel Hilbert Spaces* (Cambridge University Press, 2016), <https://doi.org/10.1017/CBO9781316219232>.

⁵⁷ A. M. Buka, "Exploring Teaching Practices and Learning Support Strategies Used by Teachers in Inclusive Classes in Primary Schools of the Eastern Cape Province of South Africa (An Unpublished Thesis)" (Walter Sisulu University, 2013).

⁵⁸ A. Woolfolk, *Educational Psychology*, 11th ed. (Upper Saddle River, NJ: Merrill Publishing, 2010),

help a class of learners understand a particular subject matter using a variety of instructional strategies, examples and evaluations while working within the constraints of the contextual, cultural and social aspects of the learning environment.⁵⁹ However, according to Feza, some of the causes of South Africa's subpar mathematics performance are connected to teacher preparedness and the execution of the curriculum.⁶⁰ Gaven et al., also posit that teachers' inefficiency, lack of a deeper comprehension of math ideas, and lack of pedagogical content knowledge (PCK) of the topic are to blame for learners' low performance in mathematics.⁶¹ They go on to add that, "conceptually based instruction of Mathematics topics needs teachers to have a thorough comprehension of the subject matter." Zambat echoes this viewpoint when he claims that improving learner outcomes in mathematics requires highly effective teacher training in both content and pedagogy.⁶²

Even while the current curriculum outlines a plan that covers what should be taught to learners at various levels, the classroom methods of mathematics teachers remain unaltered. This is consistent with the education minister's remarks that "South Africa is badly underperforming in education in general, notably Mathematics teaching and learning. Teachers' inability to respond to queries about the material they are teaching is one sign of the difficulty in providing high-quality classroom teaching."⁶³

Therefore, it was in the study's best interest to propose that this problem be solved by subjecting inexperienced mathematics teachers who had completed standard grade mathematics to a rigorous in-service training program. In this way, teachers of mathematics would be prepared to teach the topic by having both pedagogical expertise and subject-specific information. On the other hand, there is also proof that the system's trained Math teachers are either not teaching Math or aren't doing so at a level that meets their qualifications.⁶⁴ For instance, Moloi argues that unless there is high-quality teacher education that updates teachers' competencies, quality mathematics teaching in South Africa would remain a mirage. The cited author also argues that educators must work to detect their learners' learning experiences and comprehend how their schoolchildren think and learn.⁶⁵ King agrees with the writer and quantifies that teachers need to be given the necessary support by the authorities and other stakeholders that are of influence in teaching and learning.⁶⁶ Moreover, the aforesaid author argues that teachers race for higher ranks in their profession as some competent mathematics teachers hold managerial roles in schools, which results in a lack of human capital that can help decolonise classroom mathematics.

Final Considerations

The decolonisation of mathematics teaching pedagogy links learners' distinct strategies of learning and comprehending through socially constructed learning and formal mathematics content in South African classrooms. This inclusion of mathematics into the curriculum explores ways to offer more inclusive educational programs for the varied communities serviced by schools. In this sense,

⁵⁹ Soonhye Park and J. Steve Oliver, "Revisiting the Conceptualisation of Pedagogical Content Knowledge (PCK): PCK as a Conceptual Tool to Understand Teachers as Professionals," *Research in Science Education* 38, no. 3 (May 16, 2008): 261–84, <https://doi.org/10.1007/s11165-007-9049-6>.

⁶⁰ Nosisi Feza, *Good Intentions Are Not Actions: Mathematics Education of South Africa Demands Action and Pride from Citizenry*, 2014.

⁶¹ Mellony Graven, Bill Atweh, and Hamsa Venkat, *Teaching Numeracy in Pre-School and Early Grades in Low-Income Countries - GIZ Report - Atweh, Bose, Graven, Subraniam, & Venkat*, 2014, <https://doi.org/10.13140/2.1.4190.3686>.

⁶² Zambat, "Conceptual Development of Prospective Elementary Teachers: The Case of Division of Fractions."

⁶³ Angie Motshekga, "Keynote Address by the Minister of Basic Education, Delivered at the Release of 2021 National Senior Certificate (NSC) Examination Results," 2022, <https://www.gov.za/speeches/minister-angie-motshekga-opening-schools-2022-school-year-11-jan-2022-0000>.

⁶⁴ Spaul, "South Africa's Education Crisis: The Quality of Education in South Africa 1994-2011"; Diane Parker, "Grade 10–12 Mathematics Curriculum Reform in South Africa: A Textual Analysis of New National Curriculum Statements," *African Journal of Research in Mathematics, Science and Technology Education* 10, no. 2 (January 20, 2006): 59–73, <https://doi.org/10.1080/10288457.2006.10740605>.

⁶⁵ Moloi, "Mathematics Achievement in South Africa: A Comparison of the Official Curriculum with Pupil Performance in the SACMEQ II Project-."

⁶⁶ King, "Methods of Teaching Mathematics in Primary School | Sciencing."

decolonising mathematics education requires a program that incorporates curriculum relevance and develops knowledge based on students' local interests, needs, and cultures. In the other words, this decolonial Mathematics teaching pedagogy is a teaching methodology established to fit the learner's school culture as the foundation for assisting them in developing and structuring social interactions, understanding themselves and their peers, and conceptualizing mathematical knowledge.⁶⁷

By utilizing cultural referents to impart students' knowledge, skills and attitudes in the pedagogical responsibilities of schools, decolonisation of mathematics teaching pedagogy also builds on and values students' cultural experiences and perspectives, despite whether they are represented by dominant or non-dominant cultural systems. This empowers students intellectually, socially, emotionally and politically. The socioeconomic status and linguistic barriers to teaching and learning are two of the most important insights from this investigation since they were the ones that were most frequently considered. To raise the standard of education in the nation, it is imperative that the South African government restructure the overall education system by resolving every one of the concerns. Group-level differences in parental language input and children's language development are predicted by family SES. Children at the lower end of the SES range tend to experience language in a much lower quantity and quality, which has an impact on how they learn lexicon, syntax, and speech synthesis. Collegiality among teachers was viewed as essential in a time of constant change and advancement. Thus it should be seen as a chance to involve many people in addressing the intricate educational issues of the present era. By working together instead of operating individually, it is possible to meet a greater range of demands. Schools that discourage staff collaboration and permit teachers to operate independently in the classrooms deplete human resources and make teaching a less desirable profession. It is noted that setting up a collaborative and collegial atmosphere will help achieve this. This article contends that teaching is an art and the teaching of mathematics requires ongoing professional development that provides teachers with knowledge of the subject at all levels as well as classroom presentation strategies.⁶⁸ Microteaching lessons on numerous subjects must be practiced before the monitoring of mathematics classroom practices. All math teachers ought to have access to the complimentary online materials for open education in mathematics and be given the tools they need to adapt their classroom practices to the decolonisation trend.

CONCLUSION

The exploration of decolonising variables in a mathematics classroom and beyond in South African schools has clearly benefited from these interrelated aspects. One of the most important findings from this investigation is the role of socioeconomic status and language as impediments to learning and teaching because they were the most frequently considered. Consequently, it is imperative that the South African government overhauls the overall education structure by addressing all of these problems, as doing so will raise the standard of learning in the nation. Group-level disparities in parental language input and learners' language development are predicted by family SES. In a period of ongoing reform and development in approaches to teaching and learning following the covid-19 epidemic, teacher collegiality was viewed as essential. It is viewed as a chance to involve a large number of people in addressing the intricate educational issues of the present era. By working together instead of working alone, it is possible to meet a greater range of demands. Schools that discourage staff collaboration and permit teachers to operate independently in the classes deplete personnel resources and render teaching a less desirable profession. Collegiality in every organisation must be established, taught and acquired; it cannot just emerge by coincidence.

The authors contend that since teaching is considered an art, it necessitates ongoing professional development that provides teachers with resources for teaching mathematics at different levels and techniques for disseminating evidenced information in the classroom. Microteaching lessons on numerous topics must be practiced before the evaluation of mathematics classroom

⁶⁷ D'Ambrosio, "What Is Ethnomathematics, and How Can It Help Children in Schools?."

⁶⁸ Yadav, "Exact Definition of Mathematics."

instruction. Open educational resources for mathematics should be accessible to all teachers of the subject online.

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ABOUT AUTHOR

Nozuko Nqabeni is a Masters student at the Walter Sisulu University. She is also a fulltime professional teacher in the Department of Basic Education, Eastern Cape, South Africa.

Andrea Mqondiso Buka is currently a Senior Lecturer at the Faculty of Education in the continuing professional teacher development at Walter Sisulu University, Mthatha, Eastern Cape, South Africa. His research focuses on inclusive education and educational management and policy, especial psycho-pedagogical research.