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Mathematics teachers' use of assessment for learning to promote classroom diversity of learners

Author:
Sizwe B. Mahlambi[1]

Affiliation:
[1]Department of Curriculum and Instructional Studies, Faculty of Education, University of South Africa, Pretoria, South Africa

Corresponding author:
Sizwe Blessing Mahlambi,
emahlasb@unisa.ac.za

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Learner diversity should be understood beyond the aspects of race, culture and gender. Learner-centred practices have been highly acclaimed as practical tools to meet learner needs in diverse classrooms. The purpose of this research is to determine whether mathematics teachers can employ assessment to monitor and encourage learner diversity in their classes. Assessment for learning techniques, as per research evidence, has the ability to assist teachers to improve their teaching practices. The article does this by referencing research in which Grade 6 mathematics teachers employ assessment for learning to improve the quality of mathematics teaching and learning. For this purpose, interviews, non-participant observations and document analysis were used from selected teachers to understand teachers' beliefs about assessment for learning and actual classroom practices. The non-participant observation was conducted in classrooms of different primary schools. Nine mathematics teachers were conveniently sampled from township primary schools in Gauteng as the study participants. The study's findings revealed that teacher-centred assessment approaches still dominate mathematics classrooms. Furthermore, it could be deduced that mathematics teachers have classroom assessment challenges that hinder the promotion of learner diversity as it relates to assessment practices. Therefore, the study provides an understanding of the role of a teacher in responding to learner needs and academic development in mathematics through assessment for learning.

Contribution: The research contributes to primary school mathematics teaching by focusing on the practical undertaking of assessment for learning and its relevance in meeting the diverse needs of learners.

Keywords: diversity; assessment for learning (AfL); social acceptance; feedback; mathematics; social justice.

Introduction

Teachers are responsible for providing a learning environment that promotes learners' academic and socio-emotional development. Creating such environments requires teachers to 'constructively synchronize instructions and assessment toward the desired learning outcomes' (Prameswari & Budiyanto, 2017, p. 10). Teachers must understand that learners come from different backgrounds and experience learning differently due to their individual abilities (Yusuf & Pattisahusiwa, 2020). Therefore, teachers considerably influence the learning process by creating an environment that should support learning. Fundamentally, concerned teachers endeavour to support their learners physically, socially, emotionally and spiritually (Seary & Willans, 2020).

Learner diversity in a mathematics classroom is important to address if schools want to achieve the United Nations Educational, Scientific, and Cultural Organization's (UNESCO) Sustainable Development Goal 4 (SDG4) (UNESCO Report, 2021). The SDG4 seeks to ensure that, by 2030, schools will provide inclusive and quality education in classrooms. One of the targets contained in SDG4 is that learners must complete accessible, equitable and quality primary and secondary education leading to relevant and effective learning outcomes. Although the Republic of South Africa's Department of Basic Education (DBE) has met part of the SDG4, that is, providing free education for all public schools, issues of equitability and quality remain a challenge. Mullis et al. (2019) pointed out that South African learners are achieving below the Trends in International Mathematics and Science Study (TIMSS) scale centrepoint of 500. Grade 5 and Grade 8 learners who participated achieved scores of 374 and 389. The report further acknowledged that there had been increases in average achievements from participating countries. Statistically, there was a slight, insignificant decrease of two points for South Africa between the 2015 and 2019 results

(DBE, 2019). In fact, the DBE (2019) supports an inquiry into the primary school education system, covering topics such as the assistance provided to primary schools in comparison to secondary schools, as well as the nature of primary school teaching, learning and assessments. This study, therefore, looks at assessment for learning (AfL) as part of the national strategy to improve classroom instruction.

Assessment for learning should be at the centre if teachers desire to improve instruction, adjust their teaching strategies, and assist their learners in adjusting their learning strategies. The feedback derived from AfL is a powerful ingredient that enables improvements in teaching and learning. Feedback, as per Amua-Sekyi's (2016) observation, should provide an insight into how a learner is progressing toward attaining desired goals. Therefore, feedback should be a communication between a teacher and an individual learner based on their experiences with the content presented. The researcher argues that teacher professional development (TPD) should complement the deployment of AfL techniques to improve mathematics teaching and learning in South Africa. The country has its unique context that should determine how AfL should be adopted to meet the needs of learners. In addition, TPD should be cognisant of factors such as mathematics teachers' competencies and knowledge to assess (Ajani, 2020), the language of teaching (Dhlamini, 2020), overcrowded classrooms, discipline and lack of resources (Du Plessis & Letshwene, 2020).

The purpose of the study

The purpose was to explore how Grade 6 mathematics teachers at South African public primary schools use AfL to promote learner diversity. One way of attending to learner diversity is for mathematics teachers to implement differentiated assessments in their classrooms (DBE, 2011). The goal of differentiation is 'to meet learners where they are and to help them progress to the next step in their learning' (DBE, 2011b, p. 13).

Literature review

Learner diversity in a mathematics classroom

Every learner in a classroom is unique and brings individual weaknesses and strengths, and teachers have been accounted for developing creative learning environments. Mathematics teachers have, therefore, a critical role in establishing the most successful teaching and learning approaches in the classroom. During learning, learners interact with the environment and others to understand themselves and their world (Yin & Chai, 2020). Providing classroom instruction that caters to individual learners in a mathematics classroom poses a challenge for teachers (Cheung et al., 2020). Mathematics teachers should recognise that learners are different and, therefore, they learn differently (Onyishi & Sefotho, 2021). Thus, teachers must diversify their assessment approaches to make teaching practice and learning possible. To adequately respond to their needs, teachers should understand learners as individuals with differing needs (Yin & Chai, 2020). To be:

> [*R*]esponsive to the individual learner differences, teachers have to acknowledge learners in terms of ability, readiness, interests, and appropriately address these diversities by adjusting their teaching content, instructional strategies, and assessment schemes. (Yin et al., 2020, p. 611)

The 'one-size-fits-all' approach to teaching does not benefit learners (Parker & Hodgson, 2020). Each learner is unique and can learn, given an enabling environment.

The question arises whether mathematics teachers consider if the context of their instructional practices is 'serving the academic, social, and behavioural skills of all learners' (Blazar & Archer, 2020, p. 297). Numerous factors have been found to play a role in learners' academic performance, especially in mathematics, and studies have identified mathematics anxiety among others (Arslan et al., 2017; Sarı & Ekici, 2018; Vanbinst et al., 2020). Langoban (2020, p. 218) claims that 'teachers, learners, and the classroom environment make mathematics difficult'. Blazar and Archer (2020) recommended that instructional practices be crafted to meet learners' specialised academic needs. The researcher agrees with West and Meier (2020) that attending to and addressing individual learner needs remains a challenge for most teachers.

Additional challenges beset mathematics classrooms in South Africa, where the study was conducted. Some of the contributing factors in learning mathematics are the language of learning and teaching which is different from the language spoken and understood by learners (Robertson & Graven, 2020), overcrowding (West & Meier, 2020) and lack of inclusivity practices (Engelbrecht et al., 2015). Kuze and Shumba (2017) identified a lack of knowledge about AfL implementation and attitude as contributing factors. However, despite the mentioned challenges and contextual factors, there is a need to transform teaching and learning by redressing classroom imbalances through assessment. The playing field should be levelled to allow individual learners to learn mathematics.

Using assessment for learning to cater for learner diversity in a mathematics classroom

Mathematics teachers face learners with mixed mathematical abilities in one classroom. There is, therefore, a need for teachers and learners to identify those individual learner abilities or inabilities (Connor et al., 2019). Assessment for learning has always been integral to teaching and learning and is vital in helping both the teacher and the learner maximise instruction. The DBE has identified AfL as one of the critical techniques for enhancing teaching and learning in a mathematics classroom. Teachers are supposed to utilise it to gather information about learning and provide continuous feedback to learners and how they are progressing toward meeting curricular requirements (DBE, 2012). The policy also expects teachers to use feedback derived from AfL activities to attend to how they teach.

Black and Wiliam (1998) postulated that AfL is an assessment that teachers use to derive evidence with an aim to modify teaching and meet learners' needs. A suggestion was made by Hattie and Timperly (2007) that assessment's ultimate goal is creating feedback that should enhance effectiveness in the classroom. Furthermore, Stobart (2008) proposed that AfL should focus on the quality of how learning takes place. The activities completed by learners should help the teacher and the learner obtain information that can be used to modify and structure teaching and learning and report on the learning progress made (Oyinloye & Imenda, 2019). The teacher has a tool that they may use to document what the learner is doing in class and report on progress toward fulfilling the instructional outcomes.

Bloom (1984) expounded that AfL allows the teacher to have one-on-one teaching, in which they can identify learning gaps immediately and in a way that provides clarification. The information derived from teacher-learner interaction should inform teaching and provide feedback to learners about their learning and how to improve (Wiliam, 2011). Feedback plays a central role in AfL practices as it provides evidence of the effectiveness of teaching and learning. In a study conducted by Rakoczy et al. (2019), they found that feedback given by teachers led to learner confidence in how they should perform. A warning made is that for feedback to be effective and influence learning, it should be well interpreted by learners (Brookhart, 2018; Havnese et al., 2012; Obilor, 2019). That is, a learner receiving feedback should be able to make inferences about current competencies and be assisted on the actions to be taken to achieve learning goals (Obilor, 2019).

As Brown (2019, p. 5) pointed out, the use of AfL is dependent on the 'human and social context of the classroom'. Developing activities that elicit appropriate classroom information that responds to learner needs depends on the teacher's pedagogical skills in developing assessment activities. Teachers should be aware of whom they are developing the activities for. The expectation is that a teacher should be close enough to each learner to identify what the learner is doing and thinking to provide guidance. Understanding each learner in the classroom seems to be a strenuous expectation in developing countries like South Africa, where classrooms are often overcrowded. The effective use of AfL is grounded on increased learner participation in the process. Brown (2019) advised that learners should understand what is expected of them, communicate with others and reflect on their learning by identifying strengths or weaknesses that promote or hinder their learning. Smaill (2020, p. 943) suggested that 'feedback, participation, empowerment and self-regulation should be identified as mediating effects of the quality of assessment tasks on learning'.

Research question

The research question this article aims to answer is:

- How do Grade 6 mathematics teachers use assessment for learning to promote learner diversity in their classrooms?

Theoretical framework

This study was informed by Rawls's (1999) social justice theory, which stems from the desire to achieve a socially equitable allocation of fundamental social benefits. The theory is a response to entrenched inequalities and provides a framework on how to redress and redistribute the provision of equal opportunity (Badat & Sayed, 2014). South Africa's policy agenda on quality education assumes that all learners should be treated with dignity, irrespective of their ability, and cognitive and social differences (Department of Education, 2001; Terzi, 2014). The *South African Schools Act* (No. 84 of 1996) was designed to draft a unique path towards delivering increasingly higher-quality education to all learners, laying the groundwork for the development of learners' capabilities (Department of Education, 1996).

It is consequently critical for mathematics teachers to recognise the need of attending to learner diversity. Teachers must campaign for socially equitable practices in their assessment, which is at the heart of educational practices in South Africa. Schenker et al. (2019) advocated for socially fair practices that strive to identify and address inequities to eliminate any form of marginalisation of a group of learners in a classroom. Lumadi (2020, p. 3) noted that 'social justice fosters the perfect conditions for the rights, security, opportunities, and social benefits of every member of an organisation'. Therefore, AfL practices should help the teacher to document each learner's capabilities and mathematics skills.

In the context of the increasing failure of South African learners to master mathematics (TIMSS, 2019) fairness and equity become crucial to classroom practice. Social justice cannot be separated from learner-sustainable development in the classroom (Mawarti & Nurlaelah, 2021). Meeting SDG4 (quality education) requires mathematics teachers to take cognisance of learners' context and environment that could hinder the learning process. Mathematics teachers should therefore use AfL to re-evaluate their instructional methods of delivering content based on the unique needs of learners (DBE, 2011). Grade 6 learners in Alexandra township, South Africa, where the research was conducted, are in a developmental stage in terms of language usage and confidence, having begun learning mathematics in English in Grade 4 (Robertson & Graven, 2020). In a socially just classroom environment teachers should be aware that there is a need to modify their instructional practices to help learners meet outlined mathematical competencies. Learners of varied mathematics learning abilities are assisted to demonstrate their experiences, thus helping the teacher to plan accordingly.

Methodology

Research method

The single case study design, one of the qualitative research designs, was used in the study. The case study is a research

design that seeks to reveal everyday occurrences or practices (Cohen et al., 2018), thus providing insights into an issue or a concern (Gray, 2018). Additionally, a case study examines why and how during investigation of a phenomenon (Şimşek et al., 2021). A case study helps the researcher comprehend a unique case from different viewpoints (Creswell, 2013). The case for this study is made up of a group of nine primary school mathematics teachers (from different schools) teaching in public schools in a township in South Africa. All the teachers who participated in the study were teaching mathematics in Grade 6, and the researcher believed they could offer their perspective based on their AfL practices.

Sample and data collection

The data presented and discussed in this article were obtained from a sample of nine Grade 6 mathematics teachers from nine primary schools. Convenient sampling was used to select the teachers in the study. The data were collected by the researcher using semi-structured interviews, document analyses and non-participant observation. During the interviews, teachers were asked about the importance of AfL in the teaching of mathematics. The researcher looked at the teachers' documents for planning and assessment of learners. Lesson plans were analysed to check if mathematics teachers planned their lessons and assessed activities. A lesson plan is a 'prerequisite for effective and targeted teaching' (Strickroth, 2019, p. 2). Süral (2019) on the other hand proposed that a lesson plan provides detailed phases in classroom instruction. Therefore, teachers can organise teaching and learning processes and link them to assessment activities, in this case AfL (Seherrie & Mawela, 2021). Using non-participant observation, a researcher can identify the teacher's impact on learner action (Bostic et al., 2019). The researcher used an observation schedule to document classroom practices related to the assessment of mathematics. Teachers were observed on how they taught learners, how they engaged learners to improve participation in the lesson, how feedback was used to attend to the learning needs and how they tried to create a classroom environment that promotes learning. The observations lasted for one hour which was the duration of the teaching and learning period and were carried out in the third term of the school calendar. To maintain the confidentiality and anonymity of the teachers, pseudonyms MT#1–MT#9 were allocated to the teachers.

Data analysis

Data analysis allows the researcher to organise and interpret to make meaning of the information received (Cohen et al., 2018). The data collected for this research were analysed using qualitative content analysis, which assists the researcher in translating participants' perspectives into themes (Vaismoradi & Snelgrove, 2019). The semi-structured interviews which lasted for one hour were audio-taped and transcribed to provide means for analysis. Field notes were taken during interviews and non-participatory observation. The researcher took it upon himself to identify and link data by repeatedly reading and rereading data until the significance was uncovered. Once the data were understood, the researcher was able to uncover themes using classified and sorted data. As a result, the analytic techniques included transcribing and organising data into sets, employing codes to construct themes, and using words to express them (Creswell, 2013).

Trustworthiness

Lincoln and Guba (1985) list credibility, dependability, transferability, and confirmability as four general approaches to achieving trustworthiness in qualitative research. Credibility was enhanced through prolonged engagement which assisted the researcher to understand the worlds of the teachers participating in the study (Anney, 2018) and allowed the researcher to test the legitimacy of the participants' contribution (Babbie & Mouton, 2012). Member checks assisted the researcher and the teachers in verifying the data collected and allowed the teachers to make supplementary information available (Korstjens & Moser, 2018). The dependability of this research was enhanced through supervisors (Stahl & King, 2020). The supervisors verified if the instruments would help the researcher answer the question and provided feedback before the study was published. In case study qualitative research, the researcher cannot claim the results are replicable but may hope that other researchers and teachers may learn from the context in which the study was undertaken (Stahl & King, 2020). Lastly, confirmability was enhanced through the researcher remaining neutral and interpretations not being influenced by particular preferences (Korstjens & Moser, 2018).

Ethical considerations

This research study emanates from a doctoral thesis supervised by Professor G. van den Berg and Professor A.S. Mawela. The University of South Africa Ethical Clearance Committee granted ethical clearance (2019/08/14/61954705/20/MC). The researcher then sought permission from the DBE and principals of the selected schools and the consent of the mathematics teachers before collecting data. The teachers signed consent to participate in this study and were observed in their classrooms without obstructing teaching and learning. Teachers were assured of confidentiality during the presentation of research results and voluntarily participated in the study without implicit or explicit coercion.

Findings

In this study, the researcher was interested in exploring how mathematics teachers use AfL to promote diversity in their classrooms. From the inductive analysis of data collected three themes emerged: *teachers' views on the importance of assessment for learning in mathematics*, *teachers' understanding of the importance of feedback from assessment for learning* and *attending to the academic needs of learners through assessment activities.* These themes make apparent connections between

the assessment of learners and mathematics teachers' use of feedback to attend to learners' learning needs.

Teachers' views on the importance of assessment for learning in mathematics

The findings from interviews revealed that not much emphasis is placed on AfL practices by either the schools' or the education department's monitoring practices. This is shown in the teachers' responses:

> 'How I informally assess my learners in a class is left entirely up to me and my line manager who is the departmental head just needs to see if I have given some work to learners. It is not as important as a summative assessment'. (MT#8)

> 'Our district office is only interested in the summative assessment outcomes, and that's where my focus is. My responsibility is to cover all the summative assessments indicated in Annual Teaching Plan for the year'. (MT#4)

The analysis of the school assessment plan revealed that AfL was not catered for. That is, the frequency of when and how it should be administered is not indicated. Teachers do not see it as an important undertaking, although they understand the importance of feedback as presented below.

Teachers' understanding of the importance of feedback developed from assessment for learning

How teachers understand the importance of AfL feedback has a bearing on how they approach its implementation in the classroom. Mathematics teachers expressed their understanding through the following comments:

> 'Feedback is very important to learners as well as a teacher. It allows them to identify gaps both in teaching a concept and assist the learner in identifying areas that need their attention'. (MT#5)

> 'Feedback assists the teacher in reflecting on whether the instruction was effective and whether a different teaching method and approach is needed concerning the concept being taught'. (MT#1)

> 'Feedback helps the learner to attend to misconceptions they might have developed during the teaching process'. (MT# 2)

Mathematics teachers were then asked if the training during the implementation of the new curriculum was sufficient. Teachers noted that the training on the use of AfL was not enough and no further professional developments were undertaken by the education department:

> 'We only attended a week's training when CAPS [*Curriculum and Assessment Policy Statement*] was introduced. In that week the content contained in the new curriculum was discussed and not much discussion about assessment was done. I must say the training did not prepare me for what to expect in the classroom'. (MT#8)

> 'I recently joined the Department of Basic Education and the assessment training is sparingly done by the district office. Internal school discussions on assessment for learning are non-existent'. (MT#2)

The teacher responses above indicate the collaborative need to re-evaluate how mathematics teachers are professionally developed. The researcher is of the view that without a good solid foundation on teacher development, assessment for learning practices will remain an abstract notion.

Attending to the academic needs of learners through assessment activities and feedback

Teachers believe it is important to attend to learners' academic abilities by developing assessment activities that cater for different cognitive levels. The teachers commented:

> 'Assessment activities should cater for different cognitive levels of learners in the classroom. The assessment I give to learners should accommodate slow learners and at the same time those who are average and good learners'. (MT#7)

> 'My classroom has learners with various learning styles, as well as slow, average and fast learners. Slow learners are always left behind due to their poor memory and focus span. As a result, I make certain that assessments for learning activities accommodate all learners with varying capacities'. (MT#3)

When analysing the assessment activities the researcher identified that the activities catered for lower cognitive levels that are prescribed by the Curriculum and Assessment Policy Statement (CAPS) document. This could have been the reason why some learners took over group discussions and dictated answers to the members. That is, they might have found the activities unchallenging. Also, some learners were disinterested and ended up completing other work not related to the mathematics activities that were given to them.

Discussion

A total of nine teachers were interviewed, documents related to AfL implementation were analysed and non-participatory observations were conducted with Grade 6 mathematics teachers. The participant teachers were interviewed so that they can narrate how they understood AfL and its importance in mathematics teaching and learning against the context of learner diversity. From the data generated, the researcher began to look for themes and patterns from the data. The themes emerging from data are *teachers' views on the importance of assessment for learning in mathematics*, *teachers' understanding of the importance of feedback developed from assessment for learning* and *using feedback to identify learning gaps that inform planning and teaching*. These themes are discussed in different sections below.

Teachers' views on the importance of assessment for learning in mathematics

Teachers should adopt learner-centred approaches (LCA) throughout classroom instruction, according to the DBE (2011). Learner-centred approaches view the learner as an active participant in the learning process. Therefore, any mathematics teacher should possess an essential skill to transform the content and guide it towards meaningful learner understanding and knowledge development. At the centre of making the content meaningful to learners is AfL. It

is through AfL that a teacher and their learners develop feedback that should influence the teaching process (Wiliam, 2013). Teachers can decide how to present the subject matter during the planning session and make it accessible to learners (Newsome et al., 2019).

Although AfL is part of the DBE assessment policy, its application is not emphasised or fully integrated into teacher practice (Kippers et al., 2018). Preparing for summative assessment still dominates the assessment practices of teachers. During the analysis of documents, the researcher identified the planning gap. Implementation of AfL was not included in the individual school assessment plan. Mathematics teachers in Grade 6 are expected to arrange their activities based on four cognitive levels: knowledge, routine procedures, complex procedures and problem-solving, in accordance with policy prescriptions (DBE, 2011). The analysis of documents (assessment activities) revealed that activities learners completed as part of AfL catered for the knowledge part of the cognitive levels. Different researchers have documented teachers' failure to incorporate higher-order thinking questions in assessment activities (Amin & Mirza, 2020; Anees, 2017; Chandio et al., 2016; Köksal & Ulum, 2018). It could therefore be argued that mathematically gifted learners could not be challenged by the activities they had to complete.

Teachers' understanding of the importance of feedback developed from assessment for learning

The researcher acknowledges that the number of learners in each classroom may have overwhelmed the participants. Researchers of classroom environments agree that overcrowding increases learner neglect since teachers cannot pay attention to learners' academic needs (Cortes et al., 2012; Marais, 2016; West & Meier, 2020). Although the participants acknowledged the importance of classroom instruction, it is the view of the researcher that in its current form feedback cannot make a meaningful contribution to attending to learner diversity. Participants wrote corrections on the board without any explanation or interaction with learners which may result in exclusion concerning learners' mathematical ability (Possi & Milinga, 2017). Not only that, but it is worth noting that without communicating feedback teachers and learners are missing the opportunity of engaging with the content at the level of the learner. Equitable communication between the teacher and their learners is an important factor in attending to the diverse mathematics needs of learners (Possi & Milinga, 2017).

Attending to the academic needs of learners through assessment activities and feedback

Assessment and feedback are vital components that help the teacher identify how well learners understand the concept. The practical nature of mathematics teaching is to provide ongoing feedback to learners through daily activities. The study's findings show that teachers provide AfL activities to their learners, but the feedback approach may be regarded as only delivering corrections. This is supported by Khamis and Selamat (2019), who proposed that teachers view feedback as corrections written on learners' books. Taole (2021) suggested that for feedback to be effective, it must be specific and direct the learner towards improvement. Enu and Ngcobo (2022) elucidated that when teachers provide feedback as corrective measures to learner weaknesses, learner attention in regulating learning is limited. It is important that teachers should be thoughtful and thorough when giving feedback to their learners (Cohen & Singh, 2020).

What emerged from observation is that teachers prefer giving feedback to the whole class, written as corrections on the board. In the case of those teachers who tried to engage learners during discussions, classrooms became chaotic and lacked elements of providing effective feedback to learners. Therefore, teachers failed to adapt feedback to learners' needs and help individual learners identify learning gaps (Hattie & Yates, 2014). Consequently, the environment could not encourage learners to express their understanding and thought processes (Human-Vogel & Bouwer, 2005). It is commendable that teachers gave some sort of feedback to their learners, but it can be argued that, as it stands, fairness and equity were not attended to as per social justice requirements. Mills and Gandolfi (2022) recommended that there is a need to dismantle institutionalised obstacles that limit the full participation of learners in spaces of learning.

Conclusion

This study focused on mathematics teachers' use of AfL in creating an enabling learning environment that promotes classroom diversity of learners. The implementation of AfL practices should provide a step-by-step guide towards creating a fair environment that acknowledges diversity in how teaching and learning progress in the classroom. If learner diversity is about acknowledging that learning can only take place if learners are given the necessary support (DBE, 2011), then AfL practice and its implementation should take priority. A fair classroom practice should redefine the teaching and learning process wherein the teachers and their learners unpack the classroom learning needs (Wiliam, 2013). The importance of this research is evident in how it creates awareness of teachers' understanding and implementation of AfL in their classrooms.

This study suggests that mathematics teachers need to recognise the importance of AfL principles in attending to the learning needs in their classrooms. Therefore, the researcher wishes to encourage mathematics teachers to embrace AfL as it will assist them in providing appropriate feedback to learners and diversify content delivery to meet learners' academic needs. The researcher recognises that a case study is limited in the generalisability of findings and only reflects the practices of participants in a context. However, it allows the researcher to explore these practices in greater detail and

raises issues. This shows that additional study on AfL application in mathematics classrooms is still required.

Recommendations

In light of the findings of the study, recommendations may be made. The first recommendation is that higher education institutions should include in-depth assessment courses in their curriculum to enable pre-service mathematics teachers to understand the importance of AfL. Also, there is a need for in-service short learning programmes for mathematics teachers who are already employed in the sector. Thus, the teacher's readiness to assess learners in mathematics can be ensured.

The researcher recommends continuous TPD, which should provide teachers with information and knowledge on adapting and contextualising the assessment of learners. Therefore, the district personnel assigned to teacher supervision and on-site departmental management should design yearly programmes to assist, equip, support and empower teachers struggling with implementing AfL practices. The researcher suggests that the existing assessment strategy should be revised in order to expose teachers to the contextual approaches that engage them in effective AfL practices and how to provide meaningful feedback to learners.

Mathematics teachers should aim at improving their assessment planning practices. The context in Alexandra township is that learners struggle with the language of learning and teaching (Mahlambi & Mawela, 2020) as well as overcrowded classrooms (West & Meier, 2020). Instead of giving activities that learners struggle to finish, teachers should develop manageable activities. That way, more time is given to providing feedback, enabling teacher-learner discussions.

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Author's contributions

S.B.M. is the sole author of this article.

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Data availability

Raw data from the analysis of documents and observation are available on request from the corresponding author, S.B.M.

Disclaimer

The views and opinions expressed in this article are those of the author and do not necessarily reflect the official policy or position of any affiliated agency of the author.

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