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## Assessment for Learning as a Driver for Active Learning and Learner Participation in Mathematics\*

Sizwe Blessing Mahlambi\*\* 

University of South Africa, SOUTH AFRICA

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**Abstract:** The article focused on the use of assessment for learning in promoting active learning and learner participation in mathematics. Assessment for learning (AfL) has been found to enhance learning and improve performance. However, teachers' use of AfL to enhance active learning has not been clearly outlined. This study is part of the broader research study that explored mathematics teachers' use of AfL to enhance mathematics teaching and learning in primary schools in Alexandra Township, Johannesburg. A case study research-type and a qualitative approach were used to collect data from mathematics teachers. Nine teachers were purposefully selected from whom data were collected using semi-structured interviews and non-participant observation. The findings revealed that teachers had limited pedagogical knowledge in using AfL to promote active learning in their classrooms. They failed to apply a learner-centred approach that promotes effective learner participation in mathematics classrooms. Therefore, it is recommended that teachers undergo ongoing continuous development on classroom time management and planning for the effective use of AfL.

**Keywords:** *Active learning, assessment for learning, assessment methods, learner participation, social constructivism.*

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### Introduction

Many countries are concerned about low learner achievement in mathematics at schools. This is a cause for concern as mathematics provides the foundation for scientific, economic development and advancement of an individual and a country (Hodaňová & Nocar, 2016; Makondo & Makondo, 2020). Some nations around the globe have joined international mathematics benchmarking bodies, such as the Trends in International Mathematics and Science Study (TIMSS), which assess learners at various stages and gives trends in mathematics achievement. One contributing factor to low learner performance in mathematics relates to a negative attitude that could develop into severe anxiety (Dowker et al., 2016; Mbugua et al., 2012).

The notion of active learning has gained popularity as a technique for addressing learners' educational requirements (Talbert & Mor-Avi, 2019; Tharayil et al., 2018; Theobald et al., 2020). However, a variety of definitions are given to the concept of active learning. According to Abu Bakar and Ismail (2020) and Jesionkowska et al. (2020), active learning is an action that directly involves learners in the process of learning. But Hartikainen et al. (2019:2-3) view active learning as "not just something that learners do independently but is somehow organised and monitored by an instructor, therefore, an instructional approach that guides learning". The critical factor to active learning, especially in mathematics, is collaborative learner involvement which can assist the learner in improving their conceptions by using their peer explanations to solve problems (Webb et al., 2019). The Department of Basic Education (DBE) in South Africa has reported poor learner performance in mathematics over several years. The Southern and Eastern Africa Consortium for Monitoring Educational Quality (DBE, 2017) and The Trends in International Mathematics and Science Study (Reddy et al., 2019) have highlighted the predicament of mathematics performance in primary schools. TIMSS reported that South African learners continue to perform at the lower end of the rank order. As a result, mounting pressure is directed to the government to improve how teachers deliver and assess mathematics content. Particularly

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\*\* **Correspondence:**

Sizwe Blessing Mahlambi, College of Education, University of South Africa, Muckleneuk, Pretoria, South Africa. ✉ [emahlasb@unisa.ac.za](mailto:emahlasb@unisa.ac.za)



in mathematics discourses, it has been widely accepted that mathematics plays a central role in economic development (Du Preez, 2018; Gravemeijer et al., 2017; Kusmaryono, 2014; Valero, 2017).

The South African system is based on the belief that learners can learn mathematics given an enabling environment. To attend to the South Africa context, policy documents such as Curriculum and Assessment Policy Statement (CAPS), National Protocol for Assessment Grade R-12 (NPA), The National Policy Pertaining to the Programme and Promotion Requirements of the National Curriculum Statement Grades R-12 (NPPPPR) and White Paper6 (WP6) are used to create an environment that responds to learners' academic needs (DBE, 2001, 2011a, 2011b). This study explores how mathematics teachers use Assessment for learning (AfL) to enhance active learning and learner participation in Grade 6.

According to Botha (2012, p. 47), "mathematics teaching is a specialised profession, requiring content knowledge, knowledge of the curriculum, knowledge about teaching mathematics, and knowledge about how learners learn mathematics". At the centre of effective learning is assessment (Wiliam, 2013). Worldwide, various assessment types have been suggested to help teachers improve classroom instruction quality (Yelkperci et al., 2012). Different authors have defined assessment as an ongoing practice that teachers use to gather and discuss diverse sources (Dreyer & Mawela, 2020) and promote learner autonomy (Brown & Abeywickrama, 2010). According to Amua-Sekyi (2016, p. 1), assessment pertains to all activities undertaken by teachers and learners "to get information that can be used to alter teaching and learning".

Recent research in assessment, as reflected in the Curriculum and Assessment Policy Statement (CAPS) for Mathematics Intermediate Phase (DBE, 2011a), has focused on four types of mathematics assessment practices:

1. *Baseline assessment* is designed to establish whether learners meet the necessary competency skills and knowledge levels to learn a specific topic. It is administered before teaching, and teachers use it to plan and pitch their lessons appropriately.
2. *Diagnostic assessment* informs the mathematics teacher about the learner's problem areas that can hinder academic performance. Diagnostic assessment investigates content related challenges and psycho-social factors such as negative attitude, subject anxiety, poor study habits, and poor problem-solving behaviour.
3. *Formative assessment* is used to assist both the mathematics teacher (i) to modify teaching to meet individual learner academic needs (*assessment for learning*), and (ii) the learner in monitoring their learning and make adjustments in what they understand (*assessment as learning*).
4. *Summative assessment* is carried out after the completion of a cluster of related topics. Its results are recorded and used for promotional purposes.

This study aimed to explore how mathematics teachers use AfL to enhance active learning and improve learner participation in their classrooms. The research questions were formulated as:

- SRQ1: How do mathematics teachers understand the concept of AfL and its importance in the teaching of mathematics?
- SRQ2: To what extent do teachers use AfL to enhance active learning and learner participation in mathematics?

### Literature review

#### *The conceptualisation of assessment for learning as an active learning strategy to improve mathematics learning*

There is consensus in the literature that AfL has positive effects on teaching and learning. Based on the seminal work of Black and Wiliam (1998), research by Hopfenbeck et al. (2015); Hume and Coll (2009); Nortvedt et al. (2016); van der Kleij et al. (2015), and Wu and Jessop (2018) highlight the positive influence of AfL practices on the teaching and the learning process. AfL helps the teacher collect and explicate evidence of whether learning occurs and what to do next (Broadfoot et al., 2002). Smail (2020) contends that AfL necessarily involves teachers endowing their learners with skills required to assess their learning and, in the process, learning while they are being assessed (Black & Wiliam, 2018).

According to Flórez and Sammons (2013, p. 4), teachers should understand that assessment for learning:

- is part of effective planning
- is central to classroom practice
- promotes understanding of goals and criteria
- is sensitive and constructive
- fosters motivation
- recognises all educational achievement

- focuses on how learners learn
- helps learners know how to improve
- develops the capacity for peer and self-assessment
- is a critical professional skill

AfL practises adoption allows learners to be active in mathematics classroom instruction (Blanco, 2018). Active learning is a well-recognised practice in the field of education. The teacher knows its importance and benefits, but many do not understand how to incorporate it into their classroom instruction. Kyriacou (1992) explains that learners are encouraged to take ownership and control over the learning activities by becoming active in their learning. Virtanen et al. (2017, p. 2) concur, citing that active learning is an “instructional method that engages learners and includes them as active participants in the learning process”. To enhance active learning, teachers need to guide learners to take responsibility for what they learn (Virtanen et al., 2017), particularly as active learning can improve learners’ attitude, understanding of the content (Mathias, 2014) and enhance the development of their mathematical skills.

In order to ensure the effectiveness of assessment for learning, various aspects should be taken into consideration. These aspects include applying Bloom’s taxonomy in designing assessment activities, and a learner-centred approach is based on a constructivist view that incorporates both interactive and collaborative approaches.

#### *Application of Bloom’s Taxonomy in assessment for learning for learner engagement*

Most teachers are aware of Bloom’s Revised Taxonomy and apply it when designing learner assessment. The taxonomy is divided into cognitive, affective and psychomotor domains (Bloom et al., 1956). The cognitive domain discusses the mental process of knowing and understanding. The affective domain describes the experience of feeling or emotion, and the psychomotor explains the relation between cognitive functions and physical movement. Bloom’s Taxonomy of the Cognitive Domain encompasses knowledge, comprehension, application, analysis, synthesis and evaluation (Huitt, 2011). The cognitive levels are arranged from the lowest level, the simple recall of mathematical facts, to high order, complex and abstract reasoning.

To attend to the cognitive domain, the CAPS (DBE, 2011b, p. 296) identified four cognitive levels for the design of assessment activities. These four levels include knowledge, routine procedures, complex procedures and problem-solving, which should assist teachers in developing assessments in the content of mathematics towards achieving the broader aims of the subject. Each cognitive level has a description of the skills to be demonstrated (DBE, 2011b). Therefore, the mathematics teacher is expected to plan AfL activities bearing in mind the cognitive levels to elicit information on current learning patterns (Vingsle, 2014). The activity is given to learners during instruction, marked, and both the teacher and learners receive feedback on the performance.

Therefore, thorough planning of the mathematics AfL activities that engage learners is pivotal in teaching and learning. The activities should link the current and the future needs of the learner. According to Wiliam (2013), mathematics teaching practices should be motivated by the learner’s direction in their learning, the learner’s current mathematics skills or lacks, and steps needed to improve learning. Taking this into account, the teacher needs to create an environment/classroom culture that encourages interaction (Bhowmik, 2015) and sharing the route to achieving the learning intentions (Scott et al., 2014).

#### *Learner-centred approach*

Learner-centred classroom practices emerged from a constructivist learning theory and replaced teacher-centred classroom practices (Moate & Cox, 2015). According to Ahmad (2016, p. 79), this approach “appeals to learner’s needs and interest, thereby motivating continuous learning”. Active learning approaches discourage teacher mono-verbal and passive learner reproduction of material transferred (Kutbiddinova et al., 2016). Therefore, the learners take centre stage, and the teacher facilitates their active participation in completing assessment activities. The mathematics teacher’s duty is complicated and requires a teacher to translate the content into a meaningful learner experience.

#### *Interactive approach*

The interactive method allows the teacher and the learners to work together by improving dialogue and interaction (Eltanskaya et al., 2017). Using this method, teachers actively involve their learners in the learning process through increased interaction between teacher-learner, learner-learner, resources, and hands-on demonstrations. The learner is continuously pushed and encouraged to be an active role player. According to Senthamarai (2018, p. 36), interactive practices

- involve facilitator and learners,
- encourage and expect learners to participate,
- use questions to stimulate discussion, emphasising the value of answers

- give participants hands-on experience,
- engage the learner in their learning,
- is organised to meet the objectives,
- build on existing skill,
- provide for a range of learning styles,
- cultivate transferable, independent learning and
- use teaching aids to gain and retain attention.

#### *Constructivist approach*

The constructivist stance on classroom instruction is that learners can “create their understanding based on their experiences (what they know), ideas and knowledge with which they come into contact” (Richard, 2003, p. 1624). According to Vygotsky (1926), learners develop knowledge by being active and using their experiences. The constructivist approach accepts the notion that learners have the ability to create and apply internalised knowledge (Bada, 2015; Bhattacharjee, 2015). Piaget’s cognitive development is linked to the development of the thought process (Ahmad, 2016) and Vygotsky’s social constructivism, which emphasises social interaction as a tenet of classroom instruction (Amineh & Asl, 2015). It places the learner at the centre of assessment. Paramount to the constructivist approach to assessment is that learners should be encouraged to find mathematics solutions to activities given (Bada, 2015). Giving learners autonomy influences their self-directed learning and helps them monitor how learning occurs (Effeney et al., 2013).

#### *Collaborative approach*

A collaborative approach is an instructional approach through which learners work together to find a solution to a problem and complete a task (Marjan & Mozghan, 2012). In a collaborative approach, learners can listen to different perspectives and articulate and defend their ideas (Janssen & Wubbels, 2018). Collaborative means the process of classroom instruction through which classroom communities teach one another, that is, learners teaching each other, learners teaching the teacher, and the teacher leading the learners. Therefore, interaction is critical in a collaborative approach, and the responsibility of the teacher is to “nurture and encourage a sense of community among learners” (Alkaabi, 2016, p. 52). According to Slowikowski et al. (2018, p. 2), a collaborative approach “enhances problem-solving skills, inspires critical thinking; improves social interactions and support diversity, aids the development of self-management skills; develops oral communication skills and fosters the development of interpersonal relationships”. Thus, applying a collaborative teaching and learning approach in classroom instruction helps learners actively engage in AfL activities instead of listening passively.

#### *Key strategies of assessment for learning*

Wiliam’s (2013) AfL key strategies provide a route that the teacher and learners travel towards meeting learning intentions through user feedback to optimise learning and teaching.

*Table 1: Key strategies of AfL (adapted from Wiliam, 2013)*

	<b>Where is the learner going?</b>	<b>Where is the learner right now?</b>	<b>How to get there?</b>
Teacher	Teachers and learners share Mathematics learning intentions and goals.	Mathematics teacher skilfully arranges discussion through creating tasks that elicit the evidence of learning.	The teacher and the learner discuss feedback, identify learning gaps and plan the next step.
Peer		Teachers and learners create an environment that promotes classroom interaction and unpacks what needs to be done.	
Learner		The mathematics teacher, through discussion, actuates the individual learner to take responsibility for their learning.	

The strategies should help the teacher and the learners distinguish between where the learner is going with outcomes, the current learner ability or lack of knowledge, and how to achieve the ultimate goal of learning. According to Wiliam (2013), teacher-learner-learner relationships are essential in creating an environment that attends to classroom learning needs and learning gaps. Therefore, the triad relationship represented by the key strategies is critical in advancing and improving the learning process.

The different assessment methods, teacher, peer and learner, are essential in providing feedback that supports learning (Weurlander et al., 2012). The teacher engages in assessment to understand how learning is taking place (Vingsle,

2014), using both the planned (Vingsle, 2014) and unplanned assessments (Saefurrohman, 2015) to pose questions to direct and redirect the learning process. Self-assessment is a personal learner practice through which the learner reflects on their performance by making adjustments (Dreyer, 2014) and taking responsibility and autonomy of their learning (Birjandi & Tamjid, 2012). On the other hand, peer-assessment entails learners giving their peers feedback (Omar et al., 2018). The feedback provided to learners should be linked to the learning intentions highlighted and discussed by the teacher and their learners (Wiliam, 2013).

One of the distinguishing characteristics of AfL “is constant feedback to learners’ learning processes” (DBE, 2011a, p. 293). According to Black and Wiliam (1998), feedback is the most effective strategy to enhance the learning process; however, how and when teachers provide feedback determines its effectiveness. Shute (2008) suggests that feedback should be detailed and explain gaps that learners need to attend. Lipnevich et al. (2016) recommend that it should be given timeously for feedback to be effective, providing the learners with an opportunity to reflect on the learning process and act on it. But, Ahea et al. (2016) warn that too much feedback disengages learners because they may be overburdened. Therefore, mathematics feedback should not be corrections transcribed into learners’ books; it should be about meaning-making, helping the learner fill the learning gaps and attend to misconceptions.

### *Theoretical framework*

Active learning is based on the social constructivist theory, which proposes that knowledge is built and translated through learners. Social constructivism emphasises the importance of social interaction in classroom instruction (Verenikina, 2010; Vygotsky, 1978). According to social constructivist theory, knowledge is “developed in coordination with other human beings” (Amineh & Asl, 2015, p. 3). Therefore, the learning process is coordinated jointly at a social level (Amineh & Asl, 2015). Instead of learners being passive in acquiring knowledge delivered by the teacher, the learning process occurs through interaction between all learners and their teacher, engaging learners’ social and cognitive presence during classroom instruction (Lowyck & Pöysä, 2001). Thus, learners need environments that enable them to take charge of their learning rather than relying on traditional methods used in teaching, learning and assessment in mathematics classrooms. For learning to take place, learners need instruction that makes sense to their world. For instance, learner-centred classroom instruction approaches effectively promote the learning process (Abdelmalak & Trespalacios, 2013; Mehdinezhad, 2011; Mpho, 2018). According to Green (2015, p. 57), teachers who use learner-centred approaches to teaching focus on “providing a supportive learning environment for students, fostering positive expectations for success in the subject, and using an intrinsic motivation to give high subjective value to the learning goals”.

### **Methodology**

In this study, a qualitative research approach was used to explain how mathematics teachers attach meaning to their experiences (Creswell, 2014) supported by an interpretive paradigm that engages a constructive pathway (Babbie & Mouton, 2008). Interpretivism claims that humans always attach meaning to their actions and refine individual experiences. The interpretivist paradigm supports naturalistic inquiry, with research conducted in its natural setting (McMillan & Schumacher, 2010). The methodological approach entails a narrative inquiry (Savin-Baden & Van Niekerk, 2007) and an instrumental case study (Gray, 2018), which was a bounded system of Grade 6 mathematics teachers (Yazan, 2015).

### *Sample and data collection*

The purposive sampling allows the researcher to choose participants who meet specific criteria (Cohen et al., 2018). Nine Grade 6 mathematics teachers from public primary schools in Alexandra Township, Johannesburg, were interviewed and observed to offer their perspective of AfL practices and experiences driving classroom practices. The public schools are located in an urban area. Information on the participants is presented in Table 2.

*Table 2. Profile of participants in the Study Group (N=9)*

<b>Teachers</b>	<b>Scale</b>	<b>f</b>	<b>%</b>
Gender	Male	4	44%
	Female	5	56%
Teaching experience	Less than 10 years	6	67%
	More than 10 years	3	33%
Continuous development	No	5	56%
	Yes	4	44%
Total		9	100%

Data were collected through one-on-one semi-structured interviews and non-participatory observation (Creswell & Creswell, 2013). For semi-structured interviews, an interview schedule was used to interview teachers at their convenience and lasted for around an hour. All the interviews were audiotaped to capture teachers’ responses, and the

recordings were transcribed to provide means of analysis. The non-participatory observations were conducted in the mathematics classrooms. The researcher remained in the classroom until teachers gave feedback or corrections were given to learners.

### *Analysing data*

The data for this study based on teacher views obtained from semi-structured interviews and observation were analysed using qualitative content analysis (Flick, 2013). The interviews were audiotaped and took place in settings that allowed for interaction between the researcher and the teacher. This enabled the researcher to ask probing questions and record the teacher's thoughts and feelings (McMillan, 2016). An observation document was used to record teacher practices in a context specific to teacher understanding and application of AfL in mathematics classrooms. The researcher kept the field notes to record interactions and observations with the teachers, primarily those that could not be audiotaped. The observation was done based on teacher's AfL approach, intervention and influence towards active learner participation in AfL activities. The researcher also observed how teachers and learners developed and used feedback to create dialogue. The data analysis involved: (1) create and organise data, (2) reading and profiling, (3) classifying data, (4) interpreting the data, and (5) representing and visualising data (Creswell, 2013). The analysis procedures involved transcribing and data into sets, using codes to establish themes and representing them using words (Bature & Atweh, 2019).

### **Findings**

The themes that emerged from the interview data included teacher understanding of AfL, teacher use of assessment methods for active learner participation, and using assessment for learning feedback to create dialogue. The teachers are referred to as MT#1 – MT#9.

#### *Teacher understanding of AfL*

According to interviews with teachers, teachers understand what AfL implies in their mathematics classrooms. When asked what their understanding of AfL teachers is, they had the following to say:

*"Assessment for learning is the assessment given to learners after teaching them a concept to check their understanding and skills. It promotes teacher-learner engagement on the subject matter." (MT#4)*

*"It is the assessment that helps the teacher check how learners are progressing in developing a mathematical concept. The teacher probes further how learning is taking place and communicates the findings with the learner." (MT#7)*

*It is the assessment the teacher uses to trace learners' understanding, whether the learners are mastering the concept taught or the teacher has to change and use different teaching methods. (MT#2)*

According to the researcher's observations in the classroom, the teachers had difficulty applying their understanding of AfL. For example, they were disengaged during activity completion, resulting in less learner engagement and discussion within groups. As a result, teachers failed to identify learners who required assistance or pinpoint learning gaps and misunderstandings that might have occurred during teaching. According to the study, teachers did not demonstrate any urgency in fulfilling the academic demands of their learners.

Amongst teacher understanding of AfL was the idea that it prepares the learners for summative assessment. That is, learners and teachers have an idea of how a learner might perform over time. On the relationship between AfL and summative assessment, one teacher said:

*"Assessment for learning is the assessment done on a day-to-day basis. It is a building block towards the formal assessment, and there is a strong link between the AfL and summative assessment. Before there is a formal assessment, there should be a series of informal assessments." (MT#6)*

#### *Teacher use of assessment methods for active learner participation*

Different assessment methods assist both the teacher in developing feedback that can improve teaching and learning. The method chosen is based on the teacher's view on its effectiveness and classroom realities. This line of thinking is revealed in the excerpts below:

*"To encourage learner participation, I apply self-assessment because it allows learners time to reflect on their performance. Each learner can identify gaps in their learning and what they need to do to improve. The feedback is personal, and the learner can criticise themselves and ask for help." (MT#1)*

*"For effective participation, group assessment is the best. In group assessment, learners work as a group in completing an activity, and each group presents their solutions to the class, allowing for class discussions based on the feedback. Learners master the concept faster when participating in a group." (MT#2)*

Additionally, one teacher indicated the impact of classroom contextual factors on the use of assessment methods. The teacher cited the consequences of the number of learners in a class by saying:

*"I use a combination of peer and teacher assessments because of the number of learners in my class. Self-assessment does not work for my class, having to teach fifty-nine learners. I want learners to develop their feedback and engage with the material before them, but, unfortunately, they cheat." (MT#7)*

Classroom observations indicated that, while instructors recognize the importance of utilizing different evaluation methods, they struggle to put them into practice in the classroom. The majority of discussions were quickly taken up by learners who understood what was expected from the activities. They gave out answers without group discussions about the problem-solving process, leaving other students to mimic what they did. Though teachers divided the class into groups to complete activities, the researcher observed that there were no individual contributions towards the activity product.

#### *Using assessment for learning feedback to create classroom dialogue*

The findings from the interview data brought to light teacher understanding of the importance of feedback in creating teacher-learner dialogue. Teachers indicated how feedback could create an environment in which learners and the teacher engage in discussions. The excerpts below reveal their views:

*"Feedback is essential to both the teacher and the learner. It is through the feedback that they identify and begin to discuss learning gaps that need their attention. Authentic feedback sessions allow learners to tell me how they arrived at a particular answer. Though feedback is part of the assessment for learning, giving individual learner feedback is impossible in a classroom of plus 50 learners." (MT#5)*

*"During the feedback discussions, my learners and I can discuss misconceptions they might have developed during the teaching process. I have noticed that learners that actively participate are doing well in mathematics. But such learners are a minority in my mathematics classroom." (MT#2)*

*"It is interesting sometimes that learners would point out what I have omitted during the teaching process during discussions. Therefore, I try to encourage my learners to communicate with me during assessment for learning activities. But encouraging participation in a class of fifty-five learners is hard work." (MT#1)*

In addition, teachers believed that allowing learners to communicate directly with the teachers contributes to their learning. The responses thus far suggest that teachers recognise the importance of AfL in mathematics active learning. These statements concur with Al-Hattami (2019) that feedback assists the teacher and their learners bridge the learning gap. Moeed (2015) also points out that classroom discussions based on feedback help the teacher 'read' what learners think. Further, Amua-Sekyi (2016) espouses that improved classroom discussions eliminate traditional classroom interaction symbolised by teacher dominance.

According to data gathered from classroom observations, teachers did not completely grasp how to provide feedback. After the students finished the activities, the teachers wrote the corrections on the board and instructed them to copy the answers in their books. Furthermore, there was no discussion or involvement from learners to highlight any misunderstandings or learners' lack of comprehension.

## **Discussion**

This study explored how mathematics teachers used AfL to encourage the active participation of learners in mathematics. The findings of this study showed inconsistencies between what teachers believe and classroom practice (Chan, 2016; Kaymakamoğlu, 2018; Tamimy, 2015). Furthermore, the findings revealed gaps between what teachers believe to be authentic practice and actual classroom practice. The mismatch between what teachers think about AfL practices, active learning and actual classroom practice might mean that mathematics teachers lack a pedagogical understanding of AfL, which, as indicated earlier, is vital in the effective teaching of mathematics (Botha, 2012).

Although most teachers articulated their understanding of AfL, how they use assessment methods to improve active learner participation and feedback to create classroom dialogue, the actual classroom practice data revealed that teachers do not have social constructivist knowledge and skills needed to conduct practical learner assessment (Kim, 2001). Implementing learner-centred approaches can help "increase active learner participation, improve their problem-solving skills and learning outcomes" (Abdullah & Yang, 2019, p. 48), but this was not fully evident in this study.

In all nine schools visited, teachers spent most of the time teaching and little time left to complete AfL activities and give feedback. Teachers had one hour to teach and assess the concept presented. Learners passively received knowledge and skills related to the concept and used these to complete the assessment activity. Firstly, because of the number of learners in each of the classes, discussions within the groups became disorderly, with teachers failing to manage constructive discussions and some learners choosing to complete activities alone (Chiphiko & Shawa, 2014). Secondly, the teachers could not give personal or individualised attention to groups experiencing challenges. According

to Malinović-Jovanović et al. (2018), giving individualised attention provides space for the teacher and their learners to discuss if the goals and objectives are achieved. Mathematics teachers should acknowledge that their classrooms contain learners with diverse learning needs, such as “language, intellectual and cognitive abilities, behaviour, culture, or limited experiential backgrounds that can significantly interfere with successful learning” (Karadag, 2010, p. 2), and it is vital to use active learning practices to address these needs.

Based on classroom observation, most learners did not make an effort to participate in groups towards completing activities fully. It appeared that the majority of learners did not understand what they had to do to complete the activities, nor were they motivated to learn mathematics. The dominant learners soon took over and dictated how the group should answer the questions (Alanazi, 2016). Because learners in Grade 6 have not fully developed discussion skills, relegating the teacher to a facilitator (Goodyear & Dudley, 2015) can, on the other hand, create challenges for learners who require well-structured classroom environments to perform. Though teachers reported the importance of using assessment methods to improve learner participation in their learning, their teacher-centred teaching styles may explain learner disengagement in assessment.

Observation revealed that teachers struggle to give feedback that is constructive based on individual learner’s needs. Two factors were found to inhibit giving feedback: classroom size and time constraints. Because of the number of learners in the classrooms, teachers could not move around to check what learners were doing and working on in their respective groups. In all the classes observed, learners took a long time to finish the activities, and with little time left, teachers hurriedly wrote the corrections on the board. There was no time left to engage with the teacher as learners copied work from the board.

Even though teachers accepted feedback as an essential tool to facilitate learner participation, it was observed that they do not have pedagogical tools to develop and use it effectively. This corroborates earlier studies that effective instruction in large classes is a challenge (Ayeni & Olowe, 2016; Motsepe et al., 2019; Nguyen, 2015). “One-size-fits-all” approach (West & Meier, 2020, p. 9) to developing and using AfL feedback does not attend to individual learner mathematics needs. According to Anthony and Walshaw (2009, p. 9), teachers who attend to the “differing needs of learners derived from capabilities allow learners to develop a positive attitude to mathematics”. Neglecting the mathematics needs of the learners has far-reaching consequences for meeting their educational needs. The author recognises that teaching learners with diverse educational needs can be complex; however, inclusivity necessitates that teachers accommodate diversity in their classrooms.

In all the classes observed, teachers had a one-hour lesson to teach and assess the concept, and the time generally was inadequate. Therefore, time management is essential if teachers want to maximise the attainment and cover learning intentions in the allocated time (Sahito et al., 2016). Sahito et al. (2016, p. 47) continue to point out that the “impact of teacher time management is directly proportioned with learners’ performance”.

### Conclusion

Classroom instruction undoubtedly goes through significant changes as the world evolves and new information that constitutes effective teaching and learning emerges. The shift from teaching to assessment that informs teaching emphasises the teacher’s role in taking the needs of the learners earnestly. Learning has to become more personalised, which is not an easy undertaking with all educational needs of learners in one classroom. Yet, learner autonomy in directing how learning should unfold in mathematics classrooms is the nucleus of classroom instruction. AfL practices provide teachers with a unique opportunity of transforming pedagogy and practice concerning learner participation in mathematics.

Returning to the questions posed at the beginning of this article concerning whether mathematics teachers understand what AfL is, its importance in mathematics teaching and how teachers use AfL to enhance learner participation, the discussion above paints a complex picture. As a learner-centred practice, AfL practices must support the active participation of learners in mathematics. As such, active participation offers possibilities through which meaningful learning might be achieved.

This study concludes that stakeholders must work together to help teachers meet educational objectives.

### Recommendations

The first recommendation for teachers includes extensive planning that considers contextual factors that hinder active learner participation. Learner-centredness does mean teachers divide learners into groups and be disengaged, especially when learners are completing classroom activities. The opposite is true; a close relationship with learners is exceptionally vital. Teachers can use these moments to identify learning gaps and challenges groups face and attend to them promptly.

Secondly, mathematics teachers should receive ongoing support through onsite development on the use of AfL to create a classroom environment that supports active learning and participation of learners. The support should identify



planning challenges and the gradual move from traditional assessment practices towards learner-centred application of assessment.

### Limitations

This study had two limitations. The results are specific to a particular area, and conclusions cannot be generalised to other areas. Secondly, the qualitative data provided only a minimal scope on implementing AfL practices in mathematics classrooms. Therefore, further studies are required to investigate teachers' views on the relativity of AfL in mathematics classrooms.

### Ethical consideration

All of the participants gave informed and written consent. The Research Ethics Review Committee at the College of Education: University of South Africa (ref: 2019/088/14/619547005/20/MC) gave ethical approval along with the Department of Basic Education. Anonymity and confidentiality were adhered to throughout the study.

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