Journal of Education, 2022
Issue 89, http://journals.ukzn.ac.za/index.php/joe doi: http://dx.doi.org/10.17159/2520-9868/i89a02

Exploring the use of assessment for learning in the mathematics classroom

Sizwe B Mahlambi

Curriculum and Instructional Studies, College of Education, University of South Africa, Pretoria, South Africa
emahlasb@unisa.ac.za
https://orcid.org/0000-0001-5691-8214

Geesje van den Berg

Curriculum and Instructional Studies, College of Education, University of South Africa, Pretoria, South Africa
Vdberg@unisa.ac.za
https://orcid.org/0000-0002-0306-4427

Ailwei S Mawela

Curriculum and Instructional Studies, College of Education, University of South Africa, Pretoria, South Africa
mawelas@unisa.ac.za
https://orcid.org/0000-0002-7043-8716

(Received: 19 September 2020; accepted: 21 April 2021)

Abstract

Assessment for Learning is useful in producing feedback that mathematics teachers may utilise to enhance classroom teaching. In this study, we look at how mathematics teachers in Alexandra Township, South Africa, utilise assessment for learning (AfL) to create a classroom culture that responds to learners' knowledge acquisition. This study used a qualitative technique within an interpretivist paradigm and a case study design. We purposively selected nine Grade 6 primary school mathematics teachers. Data, collected through face-to-face semi-structured interviews, non-participant classroom observation, and documents, was analysed using qualitative data analysis. Results revealed, first, that the participants understand AfL as those activities given in class at the end of the lesson to measure learner understanding. Second, data revealed that the participants depend on textbooks for AfL activities that do not always take learners' contexts into account. Finally, the study revealed AfL challenges because teachers teach mathematics in a language other than the learners' home language. We recommend that in-service teachers attend several assessment developmental workshops to help them focus on pedagogical practices that will improve AfL implementation.

Keywords: assessment for learning, mathematics, Grade 6, teachers, transformative learning

Background and introduction of the study

> In 2003, the first democratically elected president of South Africa, Dr Nelson Mandela, remarked that "education is the most powerful tool we can use to change the world." (para. 13)

Access to quality education is a human right that is enshrined in the South African Constitution (Republic of South Africa, 1994). Quality education equips an individual with the ability to interpret things correctly and to apply the gathered information in real-life scenarios (Thangeda et al., 2016). In the case of South Africa, a worrying factor, though, is that disadvantaged learners continue to fall behind, leading to situations in which "remediation is almost impossible due to learning gaps over the years" (Spaull, 2013: 6). Spaull's assertion is backed up by international results such as Trends in International Mathematics and Science Study (TIMSS, 2019) that indicated that South African learners perform among the lowest in mathematics. Noteworthy here is the fact that public schools in the Department of Basic Education (DBE), differ enormously with the better performing schools catering to 25% of learners and the underperforming sector to 75% (Spaull, 2013). This draws our attention to classroom practices that are meant to improve learners' academic performance. In this research paper, we look at assessment, especially assessment for learning, as a tool useful for addressing learner performance in mathematics.

According to the Department of Basic Education (2011), continuous assessment is integral to the teaching and learning process; it incorporates baseline, formative (assessment for learning), diagnostic, and summative assessments. A vital role of assessment is the development of feedback that is used for a variety of purposes. Baseline assessment assists the teacher to discover what learners know and can do. Formative assessment points to the improvement of teaching and learning while diagnostic assessment is used to identify learning difficulties, and summative assessment to determine the overall performance (Dreyer, 2014).

Classroom assessments go beyond the teacher merely receiving information about what learners know and what they can or cannot do. Umugiraneza et al. (2017, p. 3), suggested that all assessments undertaken should assist the teacher and the learners "to acquire information applied to adjust teaching and learning." For instance, the use of AfL should help the teacher develop feedback that is used to improve teaching and learning (Black & William, 1998). Mathematics teachers use AfL to create a classroom environment that responds to learner knowledge development and supports the learning of mathematics. Many learners never develop solid mathematics concepts and skills, and this is evident in the results of large-scale assessments such as TIMMS that is conducted every four years and even previous rounds of the Annual National Assessments (ANA) (Department of Basic Education, 2015). Because mathematics is a cumulative subject in which concepts are built upon through grades (Department of Basic Education, 2011), the lack of a properly laid foundation may result in learners finding mathematics difficult (Bojuwoye et al., 2014). Therefore, creating an environment that links the progression and learning of a concept is vital to the mathematics

classroom. Teachers have to continually "create a dynamic system in which learning targets, associated learning paths are all subject to continuous improvement to guide pedagogy and curriculum implementation actively" (Confrey, 2019, p. 4). Therefore, there is a need to create classroom conditions that stimulate intervention for learner support, hereafter referred to as classroom culture.

Classroom culture has been defined by Hussein (2016) as both the learners' and the teacher's acceptable classroom instruction behaviour. Fat (2015, p. 1) defined it as an association of "values, beliefs, expectations and behaviours which prevails in the classroom, conditioning its performance." According to Garibay (2015), classroom culture is an environment that is conducive to learning, in which learners will feel safe, valued, respected, and encouraged to demonstrate their potential. According to Hongboontri and Keawkhong (2014), a classroom culture is unique and distinctive in arising from the context to influence how teachers and learners behave. Although every Grade 6 mathematics classroom is diverse and unique, it is the mathematics teacher's responsibility to create an enabling learning culture that encapsulates and responds to their classroom realities (Banks, 2014). Therefore, the quality of classroom culture is crucial to teaching, learning, and responding to the needs of learners. In diverse classrooms, with learners progressing and learning at different rates and levels, interventions should be implemented to aid learning for all.

The journey toward creating an inclusive classroom culture that supports teaching and learning is not an easy undertaking. The lived experiences of the teacher and the learners create a unique culture that affects the learners' social and academic abilities to meet desired goals (Zulfiquar & Zamir, 2015). Classroom culture is inextricably linked to peoples' view of the world, their identity in relation to the classroom environment, and their thinking processes (Hussein, 2016). Therefore, as determined by the teacher and the learner, classroom culture will establish how they respond to the material placed before them. Corroborating this view, Altum (2013) contended that classroom culture is a vital element that influences quality in practice.

A classroom culture responsive to learners' needs is democratic; learners take full responsibility for their learning but ascribe to certain principles such as attentive listening, appreciation, not using put-downs, maintaining the right to pass or participate, and showing mutual respect (Hussein 2016). Drawing on Wojcicki (2002), Hussein suggested that all share control in the classroom in which the mathematics teacher works as a facilitator and a teacher and believes that learners can achieve. Additionally, the planned curriculum must be relevant to real life and must make sense to the learner. Wojcicki (2002) believed that the teacher should model desirable behaviour, exhibit a passion for the subject and/or for teaching, and be seen by learners as fair, knowledgeable, unbiased, willing to help, and easily approachable.

Although AfL application has been mandatory and its effects on learning and teaching documented (Black & William, 2018; Cambridge Assessment International Education, 2017; Higgins, 2014), a variety of variables obstruct its alignment in classroom practice (Carless, 2011; Lumadi, 2008; Udoba, 2014). Among these factors are teachers' lack of understanding

of AfL practices (Moges, 2018), their lack of AfL pedagogical knowledge (Izci, 2016) and the unwillingness of learners to participate in their learning (Aziz et al., 2018). This research was undertaken to probe the matters related to AfL practices in mathematics classrooms in more depth.

The following research question guided this study:

> How do primary school teachers in Alexandra Township use assessment for learning in the teaching of mathematics?

In this article, we examine the mathematics teacher's role in creating a classroom culture using assessment for learning that improves learning.

Literature review

The literature review focuses on AfL in the mathematics classroom, teachers' competency in planning assessment activities, the language of teaching and learning in the assessment activities, the importance of assessment for learning feedback, and integrating learners' context in the AfL activities. We view these aspects as playing an essential role in creating a classroom culture that responds to learners' needs through AfL.

Assessment for learning in the mathematics classroom

Assessment is a critical component and is integral to teaching and learning mathematics in Grade 6 and assisting the teacher to explore what learners can do. Using assessment, mathematics teachers can collect, analyse, and interpret learner information to make informed decisions about the next step in instruction (Department of Basic Education, 2011; Jabbafar, 2009). To address classroom instruction, AfL has been touted as a tool to engage and assist both the teacher and the learner (Yelkpieri et al., 2012). The use of AfL in mathematics is meant to develop feedback to improve learning (Dreyer & Mawela, 2020). Moreover, AfL helps the teacher to plan for the next teaching step (Cambridge Assessment of International Education, 2017). The core emphasis of AfL practice is to assist the teacher in responding to the needs of diverse learners in their classrooms (Tlale, 2013) and to move the focus from direct instruction to engaging learners in their learning by helping them construct conceptual understanding themselves (Lai et al., 2019).

Informed by seminal research that AfL practices can improve learner achievement (Black & Wiliam, 1998), the South African Department of Basic Education (DBE) has made significant changes to the assessment policy. The development of the Curriculum and Assessment Policy Statement (CAPS) is aimed mainly at improving mathematics teaching, assessment, and learning (Department of Basic Education, 2011), by requiring mathematics teachers to use AfL to provide feedback to learners and address gaps so that further learning can take place. AfL, viewed as a tool teachers can employ to improve learning in their classrooms (Black & Wiliam 2006; Stobart, 2008), adopts a learner-centred approach to classroom instruction in helping the teacher to identify learners' academic needs (Wilson,

2005). However, Das et al. (2017, p. 41) warned that AfL "carried out too frequently, impedes students' independent learning." Learners become dependent on the teacher and other learners without putting effort into their learning.

Teachers' competency in planning assessment activities

To be an effective teacher requires a combination of pedagogical skills, and assessing learners is one of them. Practical classroom assessment is determined by good planning (Arafah & Sihes, 2015) to check how learners progress towards meeting educational objectives (Maki, 2002). AfL is used to determine if learners have grasped the concept taught and to reinforce what is learnt. Teachers' AfL pedagogical skills often become visible in planning for learner assessment (Kim et al., 2019), where the teacher links the activities to what is being taught (Nesari & Heidari, 2014). Teachers must have a clear objective in relation to what the learner should be able to do and the skills that they want learners to demonstrate. Planned assessment, therefore, assists the teacher in remaining focused on the objective of the lesson.

Another dimension involved in teacher planning is the ability to infuse competency skills in the assessment activities. The CAPS for Mathematics Intermediate Phase outlines the content and concepts to be taught over the four terms and indicates the cognitive levels for Grade 6 that the teacher should consider when planning AfL activities). AfL activities should be appropriate to the age and cognitive levels of learners (Department of Basic Education, 2011). Planned activities, therefore, allow the teacher to ensure that there is a coherent flow of skills between teaching and learning and that this is applied in the activities completed by the learners. According to Musingafi et al. (2015), planning a lesson and assessment assists a teacher in many different ways:

- the teacher follows correct steps and procedures in teaching;
- time is not wasted in the class since the period of one lesson must be used to cover the day's lesson topic;
- meaningful objectives are pursued in the lesson;
- activities are related to the content and objective;
- instructional materials are adequately selected and utilised;
- proper evaluation procedures and tools are used;
- a substitute teacher can use the lesson plan to hold on to the class; and
- the most important content is identified for learners. (p. 58)

Commenting on planning, Kekahio et al. (2014) suggested that teachers identify and plan to use relevant resources to aid concrete concept development. The use of resources in classroom instruction "enhance[s] curriculum delivery, meets the needs of learners, and enhances [s] pupils' enrolment and retention" (Okongo et al., 2015, p. 140). Therefore, using resources assists the teacher in lesson differentiation that includes tailoring the lesson to the different learning styles and capabilities of learners. A study by Okongo et al. (2015) concluded that learners were more engaged and that they enjoyed the lessons in which

resources were used. In planning, the teacher must have a comprehensive perspective of the curriculum flow from learning intentions to assessment activities.

Language of teaching and learning in the assessment activities

Language is central to classroom instruction. Mathematics assessment requires that both the teacher and the learner communicate effectively (Mulwa, 2014). For learners to succeed, they must be assisted to acquire the correct vocabulary of mathematics. The language used in mathematics is both the "means of communication and an instrument of thought" (Khalid & Tengah, 2007, p. 2). The language of mathematics assessment is relevant because the language of learning and teaching (LoLT) in the South African context usually differs from learners' home language (HL). It is assumed that the learner reaches Grade 6 when proficiency in LoLT has been reached. However, if this is not the case, this could affect learner performance. This statement aligns with that of Henderson and Wellington (1998), who pointed to the link between the language used in the mathematics assessment and the quality of learners' work. This means that the language in which the content is being assessed plays a significant role in understanding the activities they have to complete. Rollnick (1998) pointed out that teachers cannot overlook the impact language has on learners' assessment, and De Backer et al. (2019) contended that it is detrimental to ignore the impact of language on learning. The international assessment PIRLS found that South African Grade 4 learners were performing well below the international centre point of 500 (Howie et al., 2012).

The poor reading ability of South African learners whose HL is not English is related directly to poor mathematics performance (Prinsloo et al., 2018). Aljohani (2017) proposed that mathematics teachers should consider learners' language proficiency when developing AfL activities since proficiency in LoLT plays a role in how learners comprehend content. Language proficiency here denotes learners' ability to communicate mathematically through active engagement with mathematical concepts and vocabulary (Moschkovich, 2013). Sarabi and Abdul (2017) posited that mathematics teachers often neglect the mathematical language learners need to develop. How learners communicate their ideas in mathematical discourse may be influenced by their English proficiency (Vukovic & Lesaux, 2013; Zhu et al., 2015). Also, learners' lack of proficiency in English could limit their ability to communicate with other classroom members. This means that learners have to contend with issues related to LoLT and with mathematical concepts and terms (Riccomini et al., 2015).

According to White Paper 6 (Department of Education, 2001), no South African learner should be disadvantaged in any form. Every learner has a right to an education that does not pose a barrier to learning so teachers should be aware of learners' English proficiency during the teaching and learning process, particularly when developing AfL activities (Dreyer, 2014). For this reason, every effort should be made to ensure that difficulties with LoLT in mathematics in Grade 6 do not hinder the progress of a learner.

The importance of assessment for learning feedback

AfL is believed to improve classroom instruction because it provides feedback that the teacher and learners can use to decide the next step in the teaching and learning process. There is consensus that feedback is imperative to support learning and progress (Ahea et al., 2016). Feedback teaches learners the quality of work expected of them (Agbayahoun, 2016; Brookhart, 2008); it encourages learning, improves concept development and processing, and motivates learners to perform (Davis & Dargusch, 2010; Nahadi et al., 2015). Both written and verbal feedback are essential in mathematics learning. On the one hand, using written feedback, the teacher can correct errors to indicate individual learners' misconceptions regarding mathematical concepts (Razali & Jupri, 2016). Furthermore, oral feedback provides a platform on which the teacher and the learner can engage, debate, and the teacher can make provisions for learners to justify their assertions (Li et al., 2016).

Integrating learners' contexts in assessment for learning activities

Learners' backgrounds are influential in determining their mathematics performance (Lamb, 1997), and teachers' abilities to support learner performance in diverse contexts have received attention in recent times. Since South Africa is a multicultural and diverse country, this indicates a need for teachers to acknowledge individual learner demands and trajectories through differentiated instruction. Therefore, when mathematics teachers teach and assess learners, they need to understand where learners come from, how they interact with the world around them, and how they relate to the concepts presented through mathematics (Fenwick & Cooper, 2013). Classroom realities such as learners' language proficiency (Cummins, 1979, 1981) and overcrowded classrooms (Khan & Iqbal, 2012) adversely affect classroom practices. Learners' ability to understand and communicate depends on their language development (Khatib & Taie, 2016). To understand what is presented in the assessment, learners should be able to speak and write the subject's registers (Cummins, 2000). Ayeni and Olowe (2016) pointed out that overcrowded classrooms limit teachers from identifying the challenges of individual learners and giving individualised feedback to aid learning. Learner experiences are found to either facilitate or hinder their active participation and interaction (Mavuru & Ramnarain, 2018) with their context, forming a foundation that builds up ideas and understanding of the world around them (Lindsay, 2011). For this reason, mathematics teachers should be able to use the context of learners' cultural background, prior knowledge, and experience (Darling-Hammond, et al., 2020) in supporting conceptual understanding.

Theoretical framework

We used principles of Mezirow's Transformative Learning Theory (1978, 1991) to investigate how nine Grade 6 mathematics teachers from Alexandra Township use AfL practices to create an environment that responds to learners' academic needs. Mezirow identified two types of transformation—epochal and gradual. Epochal transformation occurs when the learner's meaning perspective shifts very quickly, while incremental transformation results from small shifts in the meaning schema that happen over time. Mezirow (1989)

delineated that while social interaction is crucial and desirable, being fully involved remains the learner's decision. A teacher's role is to `support and help the learner develop appropriate action to overcome whatever limitations may hinder social involvement.

The South African curriculum aims to ensure that learners acquire and apply knowledge and skills in meaningful ways to their lives within local contexts while taking into account global imperatives (Department of Basic Education, 2011). Therefore, our theoretical viewpoint resonates with Mezirow's (1978) transformative learning theory based on the psychological perspective of understanding the self, the conventional revision of belief systems, and behavioural lifestyle changes. According to Mezirow (1978), transformative theory accepts that transformation occurs when skills and knowledge are no longer functional to deal with anomalies in a new situation. In mathematics teaching and learning, educational objectives are set in terms of the expected teacher behaviour and skills needed to fulfil curricular responsibilities (Department of Basic Education, 2016). According to the Personnel Administrative Measures (Department of Basic Education, 2016), mathematics teachers must plan assessments, consider new approaches, and establish a stimulating classroom environment, aimed at developing a classroom culture conducive to learning.

AfL practices have been found to assist mathematics teachers in ensuring that their environment (classroom) responds to learners' needs (Banks & Banks, 1995). Responsive teachers create supportive classroom environments and build developmental connections with their learners to promote achievement. A classroom culture that responds to learners' needs focuses on teachers' behaviour, beliefs, and customs that shape learner action and offer insight into sustainable performance improvement (Shava & Heystek, 2019).

Research design and methods

This qualitative study is part of a larger doctoral study (reference: 19/08/14/6195405/20/MC) that explored how mathematics teachers apply AfL to enhance teaching and learning in Grade 6 in Alexandra Township in South Africa. A case study is an "intensive, systematic investigation of a single individual, group, community in which a researcher examines in-depth data relating to several variables" (Heale & Twycross, 2018, p. 7). The case study model was chosen because it allowed us to interact with the participants from within and to observe the natural world in practice (see Cohen et al., 2018). The interpretive paradigm enabled us to identify teacher meaning making attached to the phenomenon under investigation. According to Kivunja and Kuyini (2017), this paradigm allows researchers to interact with the participants as they interpret the world around them.

Sample size and selection criteria

Purposive sampling was regarded as appropriate to identify nine participants who were, at the time of the study, teaching Grade 6 mathematics at different schools. The research participants were purposively selected from nine primary schools in Alexandra Township that falls under the Johannesburg East District in South Africa. Grade 6 was selected because it is an exit grade of the Intermediate Phase (Grades 4–6). Learners are in their third year of

learning and being assessed in mathematical skills using English as LoLT and not their HL. The researchers, therefore, wanted to explore how mathematics teachers use AfL practices to create an environment that responds to learners' academic needs.

Data collection procedures

Face-to-face semi-structured interviews, non-participant observation, and document analysis were used to collect data. Semi-structured interviews based on an interview schedule were used to elicit mathematics teachers' understanding of AfL and feedback in creating a classroom environment that responds to classroom needs (Creswell, 2010). Non-participant observation offered the researchers an opportunity to observe how mathematics teachers and learners interacted and how they used the assessment activities to develop feedback (Creswell & Creswell, 2018). As researchers, therefore, we had a direct encounter with the participants in the process of documenting the AfL application as it happened in the classroom. During the non-participant observation, we sat at the back of the classroom and did not interfere with classroom instruction. We analysed a variety of mathematics teachers' documents for planning, teaching, and assessment for insight into how the phenomenon under investigation was unfolding (see Flick, 2009). The documents under scrutiny were lesson plans, AfL activities, and the CAPS document. We analysed the activities to identify if the CAPS document's cognitive levels were being catered for and whether the knowledge dimensions were being met (see Kilbane & Milman, 2014; Krathwohl, 2002).

Data analysis

The findings were generated from the data obtained in nine face-to-face semi-structured interviews, non-participant observations, and document analysis. Qualitative data analysis was used to interpret and make sense of the data (Flick, 2013; Gibbs, 2012). We read the collected data carefully and created themes following Creswell (2013) and transformed all this into clear and understandable material (see Gibbs, 2012).

Ethics and consent

The university's ethics committee granted ethical clearance for this research (Certificate Ref.2019/08/14/61954705/20/MC). Written permission to conduct the research was granted by the Gauteng Province: Department of Basic Education (Ref.2018/327), Johannesburg East District, and Grade 6 mathematics teachers. To protect participants' identities, we used pseudonyms (MT#1–MT#9). We used data collection instruments, semi-structured interviews, and non-participatory observation for triangulation to ensure the study's trustworthiness.

Limitations of the study

Since this study used a qualitative approach, its potential to be generalised to other contexts is restricted. The research population of nine participants was relatively small, considering the problem under study. We could not do follow-up interviews, and in some instances, interviews had to be rescheduled because of teacher commitments.

Research findings

From the data analysis, the following themes emerged: teacher understanding of AfL practices; teacher planning of assessment activities; learner context in the assessment activities; and assessment feedback to reflect on teaching and learning. Each theme is discussed below.

Theme 1: Teacher understanding of AfL practices

We believe that AfL's application in mathematics helps to create a classroom culture that responds to learners' needs. Classroom culture is, in this case, a set of identity characteristics and classroom traditions that the teachers and learners use to improve teaching and learning by making use of AfL feedback. Data collected from the participants during interviews and non-participatory observation indicated that teachers understand the concept of AfL in mathematics. When asked what their understanding of AfL is, teachers responded by saying:

> Assessment for learning are activities given to learners after a lesson to check their understanding of the concept taught. (MT#4)

> It is classroom activities that I use to measure how learners are progressing in understanding a mathematical concept taught. (MT#7)

Their responses show clearly that AfL is aimed at helping the learner. However, teachers seem to view AfL as a practice that removes them from the equation and that concentrates only on learners even though the literature also indicates that AfL helps the teacher to use feedback for planning to meet learners' needs (Alufohai & Akinlosotu, 2016). Another participant teacher highlighted the need for AfL practices to indicate the summative performance of learners in mathematics:

> It is the assessment that is done on a daily basis to give an idea of how learners will perform in the summative assessment. (MT#6)

The participant teachers' responses that reflect their partial understanding and application of AfL, can be linked to the need to develop a better understanding of assessment that incorporates teacher, self, peer, and group assessment. These methods assist the learners and the teacher in developing feedback used to move teaching and learning forward (Wiliam, 2013). Mathematics teachers' knowledge of the impact and benefits of applying these methods becomes vital since it will assist in creating a classroom environment that is responsive to learners' needs and will assist learners in achieving the desired education goals of learning mathematics in Grade 6. One crucial aspect lacking in their understanding is how AfL assists the teacher in improving mathematics teaching. Teachers might receive feedback from AfL activities, yet nothing is done about it. Observation revealed that feedback is assumed to be about giving corrections on the board and learners copying these into their books. There was no significant interaction between the teachers and the learners on the challenges learners encountered during the completion of the activities.

Theme 2: Teacher planning of assessment activities

The non-participatory observation revealed that mathematics teachers give learners assessment activities to complete once a concept has been taught. Of the nine participants, only two produced activities they had developed themselves. The other participants used only assessment activities taken from CAPS-aligned textbooks. This was confirmed by these statements:

> The CAPS document tells us what to teach and what schemes to assess, and all my classroom activities come from the textbook. (MT#7)

> I do not develop AfL activities; I usually use the activities that are in the textbooks I use for teaching mathematics. (MT#6)

Using already prepared material is good because it is readily available, and the activities in the textbooks have been verified and approved by DBE. However, since those approved textbook activities might not apply to the learners' specific context, it is the mathematics teacher's responsibility to interact with appropriate activities and make whatever adjustments are necessary.

On developing assessment activities, one teacher said,

> When I develop assessment activities, I start from simple to complex questions; that way, learners can show me what they can or cannot do. (MT#9)

The ability of a teacher to ask questions is central to teaching and learning. As stipulated by the Department of Basic Education (2011), the cognitive levels require teachers to use Bloom's taxonomy when developing assessment activities. MT#9, therefore, demonstrates the understanding of applying this taxonomy in AfL activities.

According to policy, AfL has the purpose of continually collecting information about learner performance that can be used to improve their learning (Department of Basic Education 2011). As mentioned previously, informal assessment entails daily monitoring of learners' progress conducted through a variety of activities. Informal assessment should be used to provide feedback to learners and inform planning for teaching (Department of Basic Education, 2011). Document analysis indicated that many teachers did not have assessment policies to guide them regarding when and how the AfL activities should be developed and administered. Yet, it should be noted that teachers were using curriculum-aligned lesson plans and textbooks, and we, as researchers, considered the two resources adequate.

Theme 3: Learner context in the assessment activities

During the analysis of the documents, it was revealed that participant teachers did not consider the learners' context and their environment. The activities did not include the reality and experiences of learners in Alexandra Township, South Africa. For example, while teachers dealt with data handling and analysis and interpreting double bar graphs, most

comparisons were made between countries and cities outside of South Africa or other provinces in South Africa. Using contextualised graphs would make it easier for learners to understand all this. Besides, during the non-participatory observations, we saw that learners struggled with activities because of the language used in them. Participant teachers had to spend time clarifying the activities to learners. In some cases, synonymous terms were used for teaching and assessment, and the teacher had to make the link between the terms. When they defined a "mean", most teachers used the word "average" and explained how to calculate average scores. Yet, the assessment activity required the learners to calculate the mean, and at times learners had to answer questions about what it "means" to describe the scores. This presented a barrier in that they had to move between spoken and mathematical registers in English.

It should be noted that the participant teachers were aware of the barrier posed by the language because of the contextual factors related to LoLT that learners have not mastered. For example, one teacher said,

> English poses a threat to the teaching and assessment of learners, and without the help of the teacher, learners cannot complete the activity given to them. It is tiring to reteach a concept in the assessment activity. (MT#1)

It is evident from the response above that mathematics teachers are frustrated by the lack of language proficiency that is a barrier to learning. The participant teachers' responses indicate that learners struggle to complete assessment activities in part because of poor language proficiency. This means that the teachers need to consider the learner context in the teaching and learning process, particularly in creating and designing the AfL activities.

Theme 4: Assessment feedback to learners

It became apparent when interviewing participant teachers that they see feedback as part of their teaching and learning. Teachers' utterances correspond with assessment policy requirements concerning feedback that states that AfL feedback should assist "learners and teachers close the gaps in learners' knowledge and skills and improve teaching" (Department of Basic Education 2012, p. 3). Participant teachers responded:

> Well, feedback assists me in knowing how to plan for my class, and on the other hand, the learners become aware of the gaps in their learning. (MT#8)

> I think feedback assists in stimulating learners' thinking, helping them in understanding themselves and what they have to do in the future. (MT#1)

Participant teachers also cited the need to use AfL to monitor learners' progress in mathematics and use the outcome to improve how they learn.

> Mathematics is a challenging subject; AfL and its feedback help learners build their self-esteem towards what is expected of them taking control over their learning. (MT#4)

It became clear from the findings that the participant teachers understood the value of feedback in driving the teaching and learning process. However, in the classes observed, the feedback was somewhat limited, and corrections were written on the chalkboard. There was a little discussion between the teachers and learners concerning how answers were derived. The classrooms lacked the collaborative engagements suggested in the transformative theory view of AfL practice. Besides, participant teachers did not check learners' books for errors or any misconceptions. The feedback provided by the participant teachers did not attend to individual learners' needs, and the time spent did not make any observable improvements to the learning. Learners hurriedly copied what was written on the board without engagement with their teachers and/or peers. According to policy, regular feedback should be provided to learners to enhance the learning experience (Department of Basic Education, 2011) and allow learners to become aware of their strengths and identify their weaknesses or areas on which they need to work. Although we agree with the policy's requirements, the classroom environment did not allow individual learner attention. In addition, classroom overcrowding is of significant concern for the attainment of any educational goals.

Discussion and conclusion

This study was conducted to explore the role of mathematics teachers in creating a classroom culture that improves learning using AfL. In this paper, we throw light on teacher understanding of AfL in improving classroom instruction. The results show that teachers realise the importance of AfL in the teaching and learning of mathematics. They assert that AfL activities allow for the development of feedback (Dreyer, 2014). Feedback is a response to learners' needs and helps create an environment that attends to learners' academic needs (Lui, 2012). First, this study reported that the focus of AfL practices should be the use of its outcome to create a classroom environment that considers learners' different needs about learning mathematics. Kagete (2013) reported that because AfL supports learner involvement that resembles teaching more than testing, it indicates that assessment is an integral part of the teaching and learning process. This means that mathematics teachers play an essential role as both facilitators and teachers (see Hussein, 2016) in the successful creation of an environment that connects mathematics content with learners' needs through their practice.

Second, rather than depending on the textbooks for activities, we suggest that mathematics teachers spend time creating activities that reflect learners' context along with the content and concepts, but, most importantly, consider the various cognitive levels (knowledge, routine, complex and problem-solving) as outlined by the Department of Basic Education, 2011: p. 296). The Department of Basic Education (2015) suggested that textbooks may inspire classroom activities. However, Ewing (2004) warned that most activities in textbooks are poorly thought out and written, focus on repetition, and cover the topic superficially. Ewing went on to point out that such activities may be isolated from the learners' real-world experiences. Using appropriate contexts facilitates learner development in making links between ideas and concepts, showing them how mathematics relates to their everyday experiences (Brown & Redmond, 2017), and ensuring that assessment problems are meaningful (Van den Heuvel-Panhuizen, 2005).

Third, Alexandra is a township, and English is the learners' first additional language, so mathematics is taught in a language that is not their HL, and this puts them under pressure (Molina, 2016). If mathematics teachers fail to attend to language challenges, they cannot determine whether learners' underperformance reflects difficulties with language or with the concepts taught in mathematics (Adoniou, 2014). According to Cummins (1979), teachers should be aware of the relationship between learners' language proficiency and academic performance. For learners, the acquisition of appropriate language skills that support academic abilities takes five to seven years (Rampton et al., 2008), and at the Grade 6 level, learners are only in their third year of learning mathematics in English, having started to do so in Grade 4.

Finally, teachers and learners should use feedback from activities to create an environment that responds to learners' mathematical needs. If feedback can "stimulate learning and self-understanding" (MT#1), mathematics teachers should use it to profile classroom needs aimed at meeting learning goals (Weurlander et al., 2012). Self-critique should be at the centre of transforming teachers' practice to meet new classroom anomalies (Christie et al., 2015).

We suggest that the Department of Basic Education and schools need to make significant efforts to assist mathematics teachers in understanding and using AfL practices. The limitations in mathematics teachers' knowledge of AfL, according to this study, indicate a lack of understanding of how it influences their planning and teaching methods aimed at creating an environment that responds to learners' needs. Learners want to learn in a harmonious environment in which cooperation is encouraged and modelled (Anthony & Walshaw, 2009). Therefore, mathematics teachers should examine how their assessment practices facilitate learners' development in their classrooms (Khedkar, 2016). Central to transforming the environment and creating a classroom culture conducive to effective learning is the teacher's ability to reflect on learner experiences to foster conditions that attend to their needs (Calleja, 2014). Professional development could greatly benefit teachers and help them find ways of using AfL to create a classroom environment that responds to learners' needs in relation to mastering mathematics.

Acknowledgement

We acknowledge the mathematics teachers who participated voluntarily in this study. The editorial work was done by the University of South Africa's language editing team. We acknowledge that the opinions, findings, and conclusions expressed in this paper are ours.

References

Aceves, T. C., & Orosco, M. J. (2014). Culturally responsive teaching (Document No. IC-2). https://ceedar.education.ufl.edu/wp-content/uploads/2014/03/IC-Cult-Resp.pdf

Adoniou, M. (2014). Language, mathematics and English language learners. *Australian Mathematics Teacher, 70,* 3–13. https://files.eric.ed.gov/fulltext/EJ1093265.pdf

Agbayahoun, J. P. (2016). Teacher written feedback on student writing: Teachers' and learners' perspectives. *Theory and Practice in Language Studies, 6*(10), 1895–1904. http://dx.doi.org/10.17507/tpls.0610.01

Ahea, M., Ahea, R. K., & Rahman, I. (2016). The value and effectiveness of feedback in improving students' learning and professionalising teaching higher education. *Journal of Education and Practice, 7*(6), 38–41. https://files.eric.ed.gov/fulltext/EJ1105282.pdf

Aljohani, M. (2017). Principles of "constructivism" in foreign language teaching. *Journal of Literature and Art Studies, 7*(1), 97–107. http://dx.doi.org/10.17265/2159-5836/2017.01.013

Altum, T. (2013). Exploring the effect of the classroom, culture on primary pre-service teachers' professional development. *Australian Journal of Teacher Education, 38*(9), 37–54. http://dx.doi.org/10.14221/ajte.2013v38n9.6

Alufohai, P. J. & Akinlosotu, T. N. (2016). Knowledge and attitude of secondary school teachers towards continuous assessment practices in Esan Central Senatorial District of Edo State. *Journal of Education and Practice, 7*(10), 71–75. https://files.eric.ed.gov/fulltext/EJ1099655.pdf

Anthony, G., & Walshaw, M. (2009). *Effective pedagogy in mathematics*. Gonnet Imprimeur.

Arafah, H., & Sihes, A. (2015). Competencies for the classroom instructional designer. *International Journal of Secondary Education, 3*(2), 16–20. http://dx.doi.org/10.11648/j.ijsedu.20150302.11

Ayeni, O. G., & Olowe, M. O. (2016). The implication of large class size in the teaching and learning of business education in Tertiary Institution in Ekiti State. *Journal of Education and Practice, 7*(34), 65–69. https://files.eric.ed.gov/fulltext/EJ1126751.pdf

Aziz, F., Quraishi, U., & Kazi, A. S. (2018). Factors behind classroom participation of secondary school students (A gender-based analysis). *Universal Journal of Educational Research, 6*(2): 211–217. https://files.eric.ed.gov/fulltext/EJ1170644.pdf

Banks, J. A., & Banks, C. A. (Eds.). (1995). *Handbook of research on multicultural education*. Macmillan

Banks, T. (2014). Creating positive learning environments: Antecedent strategies for managing the classroom environment & student behaviour. *Creative Education, 5*, 519–524. http://dx.doi.org/10.4236/ce.2014.57061

Black, P. & Wiliam, D. 2018. Classroom assessment and pedagogy. *Assessment in Education: Principles, Policy & Practice, 25*(6), 551–575. https://doi.org/10.1080/0969594X.2018.1441807

Black, P., & Wiliam, D. (2006). Assessment for learning in the classroom. In J. Gardner (Ed.), *Assessment and learning* (pp. 9–25). Sage.

Bojuwoye, O., Moletsane, M., Stofile, S., Moolla, N., & Sylvester, F. (2014). Learners' experiences of learning support in selected Western Cape schools. *South African Journal of Education, 34*(1), 1–15. http://dx.doi.org/10.15700/201412121002

Brookhart, S. M. (2008). *How to give effective feedback to your students*. ASCD Publications.

Brown, R., & Redmond, T. (2017). Privileging a contextual approach to teaching mathematics: A secondary teacher's perspective. In A. Downton, S. Livy & J. Hall (Eds.), *40 years on: We are still learning! Proceedings of the 40th Annual Conference of the Mathematics Education Research Group of Australasia* (pp. 109–116). MERGA. https://files.eric.ed.gov/fulltext/ED589546.pdf

Calleja, C. (2014). Jack Mezirow's conceptualisation of adult transformative learning: A review. *Journal of Adult and Continuing Education, 20*(1), 117–136. https://core.ac.uk/download/pdf/84895324.pdf

Cambridge Assessment of International Education. 2017. *Assessment for learning*. https://www.cambridgeinternational.org/Images/271179-assessment-for-learning.pdf.

Carless, D. 2011. *From testing to productive student learning: Implementing formative assessment in Confucian-heritage settings*. Routledge.

Christie, M., Robertson, A., & Grainger, P. (2015). Putting transformative learning theory into practice. *Australian Journal of Adult Learning, 55*(1), 9–30. https://files.eric.ed.gov/fulltext/EJ1059138.pdf

Cohen, L., Manion, L., & Morrison, K. 2018. *Research methods in education* (8th ed). Routledge.

Confrey, J. (2019). Future of education and skills 2030: Curriculum analysis: A synthesis of research on learning trajectories/progressions in mathematics. *Organisation for Economic Co-operation and Development - EDU/EDPC(2018)44/ANN3.* https://www.oecd.org/education/2030/A-Synthesis-of-Research-on-Learning-Trajectories-Progressions-in-Mathematics.pdf.

Creswell, J. W. 2010. *Qualitative inquiry and research design. Choosing among five traditions*. SAGE.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). SAGE.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative & mixed methods approaches (*5th ed.). SAGE.

Cummins, J. (1979). *Cognitive/academic language proficiency, linguistic interdependence, the optimum age question and some other matters.* Working Papers on Bilingualism, No. 19. https://files.eric.ed.gov/fulltext/ED184334.pdf

Cummins, J. (1981). *Bilingualism and minority language children.* The Ontario Institute for Studies in Education.

Cummins, J. (2000). *Language, power and pedagogy: Bilingual children in the crossfire*. Multilingual Matters.

Darling-Hammond, L., Flook, l., Cook-Harvey, C., Barron, B., & Osher, D., (2020). Implications for the educational practice of the science of learning and development. *Applied Developmental Science, 24*(2), 97–140. http://dx.doi.org/10.1080/10888691.2018.1537791

Das, S., Alsalhanie, K. M., Nauhria, S., Joshi, V. R., Khan, S., & Surender, V., (2017). Impact of formative assessment on the outcome of summative assessment – A feedback-based cross-sectional study conducted among basic science medical students enrolled in the MD program. *Asian Journal of Medical Sciences, 8*(4), 38–43. http://dx.doi.org/10.3126/ajms.v8i4.17161

Davis, S. E., & Dargusch, J. M. (2010). Feedback, iterative processing and academic trust: Teacher education students' perception of assessment feedback. *Australian Journal of Teacher Education, 40*(1), 177–191, http://dx.doi.org/10.14221/ajte.2015v40n1.10

De Backer, F., Slembrouck, S., & Van Avermaet, P. (2019). Assessment accommodations for multilingual learners: Pupils' perceptions of fairness. *Journal of Multilingual and Multicultural Development, 40*(9), 833–846. http://dx.doi.org/10.1080/01434632.2019.1571596

Department of Basic Education. (2012). *National Protocol for Assessment Grades R–12.* Government Printing Works.

Department of Basic Education. (2015). *The effective use of textbooks in the classroom*. https://www.umalusi.org.za/docs/presentations/2015/textbooks.pdf.

Department of Basic Education. (2016). Personnel administrative measures: Government Gazette No 170. Government Printing Works.

Department of Basic Education. (2011). *The Curriculum for Assessment and Policy Statement (CAPS) Mathematics Intermediate Phase*. Government Printing Works.

Department of Basic Education. (2015) *The Annual National Assessment of 2014 Diagnostic Report Intermediate and Senior Phases Mathematics*. Government Printing Works.

Department of Education. (2001). *Education White Paper 6: Special needs education building an inclusive education and training system*. Government Printing Works.

Dreyer, J. M. (2014). *The educator as assessor* (2nd ed.). Van Schaik.

Dreyer, J. M., & Mawela, A. S. (2020). *The educator as an assessor in the Intermediate Phase* (1st ed.). Van Schaik.

Ewing, B. (2004). "Open your textbooks to page blah, blah, blah": "So I just blocked off!" In I. Putt, R. Faragher & M McLean, (Eds). *Proceedings of the twenty-fourth annual conference of the Mathematics Education Group of Australasia Incorporated: Mathematics Education for the Third Millennium: Towards 2010, 1*, 231–238. Queensland University of Technology ePrints Archive. https://core.ac.uk/download/pdf/10873061.pdf

Fat, S. (2015). *Classroom culture of performance*. https://www.researchgate.net/publication/294522338_Classroom_culture_of_performance

Fenwick, L., & Cooper, M. (2013). Learning about the effects of context on teaching and learning in pre-service teacher education. *Australian Journal of Teacher Education, 38*(3), 96–110. https://files.eric.ed.gov/fulltext/EJ1012945.pdf

Flick, U. (2009). *An introduction to qualitative research* (4th ed.). SAGE.

Flick, U. (2013). *The SAGE handbook of qualitative data analysis*. SAGE.

Garibay, J. C. (2015). *Creating a positive classroom climate for diversity.* UCLA diversity & faculty development. https://equity.ucla.edu/wp-content/uploads/2016/06/CreatingaPositiveClassroomClimateWeb-2.pdf

Gibbs, G. R. (2012). *The nature of qualitative analysis: Analysing qualitative data*. SAGE.

Heale, R., & Twycross, A., (2018). What is a case study? *Evidence-Based Nursing – BMJ Journals, 21(*1), 7–8. https://ebn.bmj.com/content/ebnurs/21/1/7.full.pdf

Henderson, J., & Wellington, J. (1998). Lowering the language barrier in learning and teaching science. *School Science Review, 79*(288), 35–46. https://tinyurl.com/2jjybyvp

Higgins, S. E. 2014. *Formative assessment and feedback to learners in proven programs in education: Classroom management and assessment*. Corwin Press.

Hongboontri, C., & Keawkhong, N. (2014). School culture: Teachers' beliefs, behaviours, and instructional practices. *Australian Journal of Teacher Education, 39*(5), 66–88. https://files.eric.ed.gov/fulltext/EJ1017655.pdf

Howie, S., Van Staden, S., Tshele, M., Dowse, C., & Zimmerman, L. (2012). *PIRLS 2011: South African children's reading literacy achievement*. Centre for Evaluation and Assessment, University of Pretoria. http://www.up.ac.za/media/shared/Legacy/sitefiles/file/publications/2013/pirls_2011_report_12_dec.pdf.

Hussein, A. A. (2016). Classroom culture and its impact on English language teaching. *US-China Education Review, 6*(11), 650–656. http://www.davidpublisher.com/Public/uploads/Contribute/589c2f821df01.pdf

Izci, K. (2016). Internal and external factors affecting teachers' adoption of formative assessment to support learning. *International Scholarly and Scientific Research & Innovation, 10*(8), 2774–2781. https://files.eric.ed.gov/fulltext/ED573930.pdf

Jabbafar, T. (2009). The importance of assessment and evaluation in the educational system. *Proceedings of the 2nd International Conference of Teaching and Learning (ICTL 2009)*. https://docplayer.net/13866999-The-importance-of-classroom-assessment-and-evaluation-in-educational-system.html

Kagete, P. M. (2013, October 20–25). 186-Classroom 'Assessment-for-Learning' in secondary schools in Kenya. [Paper presented]. 39th Annual Conference of the International Association for Educational Assessment (IAEA), Tel Aviv, IL. https://tinyurl.com/4x95r2dj

Kekahio, W., Cicchinelli, L., Lawton, B., & Brandon, P. R. (2014). *Logic models: A tool for effective program planning, collaboration, and monitoring (REL 2014–025)*. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Pacific. http://eric.ed.gov/?id=ED544779

Khalid, M., & Tengah, M. K. (2007). *Communication in mathematics: The role of language and its consequences for English as second language students*. Education, Linguistics. https://www.criced.tsukuba.ac.jp/math/apec/apec2008/papers/PDF/7.Madihah_Khalid_Brunei.pdf

Khan, P., & Iqbal, M., (2012). Overcrowded classroom: A serious problem for teachers. *University of Science and Information Technology, 49*, 10162–10165. https://www.elixirpublishers.com/articles/1351260412_49%20(2012)%2010162-10165.pdf

Khatib, M., & Taie, M., (2016). BICS and CALP: Implications for SLA. *Journal of Language Teaching and Research, 7*(2), 382–388. http://dx.doi.org/10.17507/jltr.0702.19

Khedkar, P. N. (2016). Transformative pedagogy: A paradigm shift in higher education. [Paper presented]. The 3rd international conference on multidisciplinary research and practice, *4*(1), IJRSI ISSN 2321–2705, Gujarat, IND. https://www.rsisinternational.org/3ICMRP-2016/332-337.pdf

Kilbane, C. R., & Milman, N. B. (2014). *Teaching models: Designing instruction for 21st century learners*. Pearson

Kim, H., Metzger, M., & Heaton, R. M. (2019). Teacher planning sessions as professional opportunities to learn: An elementary mathematics teacher's re-conceptualization of instructional triangles. *International Journal of Science and Mathematics Education, 18*, 1207–1227. https://doi.org/10.1007/s10763-019-10019-y

Kivunja, C., & Kuyini, A. B. (2017). Understanding and applying research paradigms in educational contexts. *International Journal of Higher Education, 6*(5), 26–41. https://eric.ed.gov/?id=EJ1154775

Krathwohl, D. R. (2002). A revision of Bloom's Taxonomy: An overview. *Theory into Practice, 44*(4), 213–218. https://www.depauw.edu/files/resources/krathwohl.pdf

Lai, M. Y., Kinnear, V., & Fung, C. I. (2019). Teaching mathematics for understanding in primary schools: Could teaching for mathematics be a solution? *International Journal for Mathematics Teaching and Learning, 20*(1), 1–17. https://dro.deakin.edu.au/view/DU:30132976

Lamb, S. (1997). *Completing school in Australia: Trends in 1990s*. Melbourne: Australian

Li, N., Cao, Y., & Mok, I. (2016). A framework for teacher verbal feedback: Lessons from Chinese mathematics classrooms. *Eurasia Journal of Mathematics, Science & Technology Education, 12(*9), 2465–2480. https://doi.org/10.12973/eurasia.2016.1298a

Lindsay, P. (2011, 28 June). Abstract teaching for a concrete world: A lesson from Plato. *PS: Political Science & Politics* [published online] Cambridge University Press. https://doi.org/10.1017/S1049096511000692

Lui, A. (2012). White Paper: *Teaching in the Zone. An introduction to working within the Zone of Proximal Development (ZPD) to drive effective early childhood instruction*. https://esltaggart.files.wordpress.com/2013/04/zone-of-proximal-development.pdf

Lumadi, M. W. 2008. Teachers' exodus in South African schools: A smoke with burning fire. *Contemporary Issues in Education Research*, *1*(3), 31–40. https://doi.org/10.19030/cier.v1i3.1192

Maki, P. L. (2002). Developing an assessment plan to learn about student learning. *The Journal of Academic Librarianship, 8*(1), 8–13. https://doi.org/10.1016/S0099-1333%2801%2900295-6

Mandela, N. R. (2003). *Lighting your way to a better future.* Speech delivered at the launch of Mindset Network: Planetarium, University of the Witwatersrand, Johannesburg, RSA. http://db.nelsonmandela.org/speeches/pub_view.asp?pg=item&ItemID=NMS909.

Mavuru, L., & Ramnarain, U. (2018). Relationship between teaching context and teachers' orientations to science teaching. *Eurasia Journal of Mathematics, Science and Technology Education, 14*(8), 1–14. https://doi.org/10.29333/ejmste/91910

Mezirow, J. (1978). Perspective transformation. *Adult Education Quarterly, 28*(2), 100–110. https://doi.org/10.1177/074171367802800202

Mezirow, J. (1989). Transformation theory and social action: A response to Collard and Law. *Adult Education Quarterly, 39(*3),169–175. https://doi.org/10.1177/0001848189039003005

Mezirow, J. (1991a). *Transformative dimensions of adult learning*. Jossey-Bass.

Moges, B. (2018). The implementation and challenges of assessment practices for students' learning in public selected universities, Ethiopia. *Universal Journal of Educational Research, 6*(12), 2789–2806. http://dx.doi.org/10.13189/ujer.2018.061213

Molina, C. (2016). The problem with math is English. *The Electronic Journal for English as a Second Language, 19*(4), 1–3. http://www.tesl-ej.org/pdf/ej76/r3.pdf

Moschkovich, J. (2013). Principles and guidelines for equitable mathematics teaching practices and materials for English language learners. *Journal of Urban Mathematics Education, 6*(1), 45–57. https://files.eric.ed.gov/fulltext/EJ1085793.pdf

Mulwa, E. C. (2014). The role of the language of mathematics in students' understanding of number concepts in Eldoret Municipality, Kenya. *International Journal of Humanities and Social Science, 4(*3), 264–274. http://www.ijhssnet.com/journals/Vol_4_No_3_February_2014/26.pdf

Musingafi, M. C. C., Mhute, I., Zebron, S., & Kaseke, K. (2015). Planning to teach: Interrogating the link among the curricula, the syllabi, schemes and lesson plans in the teaching process. *Journal of Education and Practice, 6*(9), 54–59. https://files.eric.ed.gov/fulltext/EJ1082472.pdf

Nahadi, N., Firman, H., & Farina, J. (2015). Effect of feedback in formative assessment in the student learning activities on chemical course to the formation of habits of mind. *Indonesian Journal of Science Education, 4*(1), 36–42. http://dx.doi.org/10.15294/jpii.v4i1.3499

Nesari, A. J., & Heidari, M. (2014). The important role of a lesson plan on educational achievement of Iranian EFL teachers' attitudes. *International Journal of Foreign Language Teaching & Research, 3*(5), 25–31. http://jfl.iaun.ac.ir/article_557178_e1dd8862e78e270133185377871b88c4.pdf

Okongo, R. B., Ngao, G., Rop, N. K., & Nyongesa, W. S. (2015). Effect of availability of teaching and learning resources on the implementation of inclusive education in Pre-School Centres in Nyamira North Sub-County, Nyamira County Kenya. *Journal of Education and Practice, 6*(35), 132–141. https://files.eric.ed.gov/fulltext/EJ1086389.pdf

Prinsloo, C. H., Rogers, S. C., & Harvey, J.C. (2018). The impact of language factors on learner achievement in science. *South African Journal of Education, 38*(1), 1–14. https://doi.org/10.15700/saje.v38n1a1438

Rampton, B., Harris, R., Collins, J., & Blommaert, J. (2008). Language, class and education. In S. May & N. H. Hornberger (Eds.), *Language policy and political issues in education* (pp. 71–83). Springer Science + Business Media LLC. https://link.springer.com/content/pdf/bfm:978-0-387-30424-3/1

Razali, R., & Jupri, R. (2016). Exploring teacher written feedback and student revision on ESL students' writing. *IOSR Journal of Humanities and Social Science, 19*(5), 63–70. http://dx.doi.org/10.9790/0837-19556370

Republic of South Africa. (1994). *The Constitution of the Republic of South Africa. Act No. 108 of 1996*. Government Printing Works.

Riccomini, P. J., Smith, G. W., Hughes, E. M., & Fries, K. M. (2015). The language of mathematics: The importance of teaching and learning mathematical vocabulary. *Reading & Writing Quarterly, 31*(3), 235–252, https://dx.doi.org/10.1080/10573569.2015.103099

Rollnick, M. (1998). The influence of language on the second language teaching and learning of science. In W. W. Cobern, W.W. (Ed.), *Socio-cultural perspectives on science education. Science & technology education library, 4* (pp. 121–137). Kluwer Academic Publishers. https://doi.org/10.1007/978-94-011-5224-2_7

Sarabi, M. K., & Abdul, G. K. (2017, May 22–23). *Influence of linguistic challenges on attitude towards mathematics learning among upper primary students of Kerala*. [Online Submission, Paper] International Seminar on Priorities, Barriers & Directions of Education Perambra, Kerala, IND. https://eric.ed.gov/?id=ED581557

Shava, G. N., & Heystek, J. (2019). Agency and structure: Principals' ability to bring about sustainable improvement in underperforming schools in South Africa. *Africa Education Review, 16*(2), 50–68. https://doi.org/10.1080/18146627.2017.1340809

Spaull, N. 2013. *South Africa's education crisis: The quality of education in South Africa 1994–2011.* Centre for Development & Enterprise.

Stobart, G. (2008). *Testing times: The uses and abuses of assessment*. Routledge.

Thangeda, A., Baratisend, B., & Mompati, T., (2016). Education for sustainability: Quality education is a necessity in modern day. How far do the educational institutions facilitate quality education? *Journal of Education and Practice, 7*(2), 9–17. https://files.eric.ed.gov/fulltext/EJ1089752.pdf

Tlale, L. D. N. (2013). Teachers' competencies in responding to the needs of learners with barriers to learning. *Mediterranean Journal of Social Sciences, 4*(13), 143–147. http://dx.doi.org/10.5901/mjss.2013.v4n13p143

Trends in International Mathematics and Science Study. (2019). *Highlights of South African Grade 5 results in Mathematics and Science*. Government Printing Services.

Udoba, H. A. 2014. *Challenges faced by teachers when teaching learners with a developmental disability.* [Master's Thesis, University of Oslo. NO]. https://core.ac.uk/download/pdf/30903449.pdf

Umugiraneza, O., Bansilal, S., & North, D. (2017). Exploring teachers' practices in teaching mathematics and statistics in KwaZulu-Natal schools. *South African Journal of Education, 37*(2),1–13. https://doi.org/10.15700/saje.v37n2a1306

Van den Heuvel-Panhuizen, M. (2005, July). The role of contexts in assessment problems in mathematics. *For the Learning of Mathematics 25,* 2–9. FIM Publishing Association. https://flm-journal.org/Articles/1957A5517A35A04A1E9F6310B923E0.pdf

Vukovic, R. K., & Lesaux, N. K. (2013). Investigating the ways language counts for children's mathematical development. *Journal of Experimental Child Psychology, 115*, 227–244. https://doi.org/10.1016/j.jecp.2013.02.002

Weurlander, M., Söderberg, M., Scheja, M., Hult, H., & Wernerson, A. (2012). Exploring formative assessment as a tool for learning: Students' experiences of different methods of formative assessment. *Assessment & Evaluation in Higher Education, 37*(6), 747–760. https://doi.org/10.1080/02602938.2011.572153

Wiliam, D. (2013). Assessment: The bridge between teaching and learning. *Voices from the Middle, 21*(21), 15–20. https://tinyurl.com/5fe85nez

Wilson, L. W. (2005). *What every teacher needs to know about assessment* (2nd ed.). Eye on Education.

Yelkpieri, D., Namale, M., Esia-Donkoh, K., & Ofosu-Dwamena, E. (2012). Effects of large class size on effective teaching and learning at the Winneba Campus of the UEW. *US-China Education Review, 3*, 319–332. https://files.eric.ed.gov/fulltext/ED532900.pdf

Zhu, B., Chen, C., Moyzis, R. K., Dong, Q., & Lin, C. (2015). Educational attainment-related loci identified by GWAS are associated with select personality traits and mathematics and language abilities. *Personality and Individual Differences, 72*, 96–100. https://doi.org/10.1016/j.paid.2014.08.028.

Zulfiquar, T., & Zamir, S. (2015). Role of classroom culture in the academic learning of students at the university level. *Journal of Literature, Languages and Linguistics, 13,* 125–141. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.981.8810&rep=rep1&type=pdf