Alignment and Mismatches between Grade R Educators’ Views of their own Practices and Curriculum Expectations in Mathematics Education: A Reality Check.

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Abstract

Mathematics learner performance that seems to scar the South African education needs more attention and more detail in how classroom practice occurs. This paper aims to make a reality check of the currently obtaining situation regarding alignment or misalignment of practice and curriculum expectations. Data was obtained from fourteen Grade R classrooms taped and captured from a bigger project in the Eastern Cape. A series of four taped lessons per class were selected by the Grade R educators themselves which they evaluated to indicate their own practices using an adapted COEMET tool by Clements and Sarama to assess the quality of their teaching. A thematic analysis approach is employed in analyzing the captured lessons and interviews. The findings of this paper reveals that educators view some of their practices in terms fostering cognitive development, use of large and small groups, use of play in mediating learning and skill focused activities as well as their roles in initiating activities as being very much aligned to the Mathematics curriculum expectations. However there are some of their practices they view as a mismatch of the Mathematics curriculum expectations with regards to assessment of social, emotional and self-regulation skills, educator centred teaching and use of age inappropriate activities. The insights of the study make it imperative to invest in professional development for Grade R educators and are important in identifying the alignments, the gaps, and the mismatches that exist in the sector.

Keywords: Alignment; Educator practices mismatch; Professional development.

Introduction

Poor foundational knowledge in mathematics has been indicated by many international studies of mathematics in South Africa as one of the main factors of poor learner performance in the subject (TIMSS, 2011; SACMEQ, 2010). Investigating early years of learning and teaching mathematics is becoming vital. Hence this paper aims to contribute to this needed literature in South Africa.

Research in early childhood education internationally as well as in South Africa has clearly established that Grade R learners’ cognitive, personality and behavior development and are shaped by a social context that is nurturing,
supportive, stimulating and allows exploration of their innate abilities (Artmore, van Nierkerk & Ashley-Cooper 2012, EFA, 2005, (Richter, Biersteker, Burns, Desmond, Feza, Harrison, Martin, Saloogees, 2012). A supportive learning environment must aim to shape individuals to be productive in all aspects of their cognitive, and personality beings. Such an environment sharpens the individuals’ cognitive competencies, facilitates the behavioural, social, emotional and motivational aspects so that the person becomes a productive well-adjusted citizen (Evertson & Weinston, 2006; Hattie, 2009; (Korpershoek, Harms, de-Boer, Kujik, & Doorland, 2014). But critical to this context is the part played by the educators whose modelled practices shape the learning environment to make it conducive to the young learner’s development (Korpershoek et al., 2014; Pianta, Barnett, Burchinal and Thornburg 2009). This means a learner who has been properly nurtured is not only intellectually competent in mathematical skills but also self-regulated in behaviour (Oliver, Wehby, & Reschly, 2011; Durlak, Weissberg, Dymicki, Taylor & Schelling, 2011; Solomon, Klein, Hintze, Cressey & Peller, 2012). This also means the environment for learning does not just become conducive and supportive without being deliberately forged and framed to become supportive (Korpershoek et al., 2014; DBE, 2011).

However within this picture in South Africa, is the important factor of policies from Government through its various departments such as The Department of Education (DoE), The Department of Basic Education (DBE) as well as its partner institutions who provide research to anchor practice that mediates and directs implementation. It is these key stakeholders whose synergies unite to chart the path of desirable practice and service to the grade R learners in the classrooms in South Africa. A lot of research has thus been done to establish standards that spell out the learning environment considered as desirable for learning mathematics at grade R level as well as the professional development considered necessary for the grade R educators to adequately carry out their facilitation functions of setting learners on the right trajectories to learning mathematics (DBE, 2011; Artmore et al., 2012, EFA, 2005, Richter et al., 2012). Policies have also been put in place to prescribe, direct and spell out specifics of how the learning environment should be, how practice should be done, the nature and qualifications of educators right up to the detail of what is allowable and what is not in the classrooms (Heckman, 2014; Education White Paper 5 (WP5) of 2001; ECD Guidelines, 2006; Norms and Standards for Grade R funding (NSF Grade R) of 2008 NSF Grade R, 2008; National ECD Policy Draft, 2014). However there is limited research that has closely combed the landscape to find out whether, educators’ views of their own practices and policy expectations as spelt out in the curriculum regulatory frameworks are in tandem in delivering the desirable learning contexts in mathematics for Grade R learners. Internationally in places like the USA, research has shown that at times is possible for practice in the Grade R sector to be mis-aligned to policy (Pianta, et al., 2009) This paper aims to establish whether or not there is alignment or mis-alignment between educators’ views of their practices and policy expectations in South Africa, in order to inform professional development and shape intervention. To accomplish this, the paper addresses the following research questions:

- Are expectations in the Grade R Mathematics Curriculum Assessment Policy Statement (CAPS, 2011) and educator views of their own practices well aligned or mismatched?
- What areas of educators’ views of their own practices and policy directives need to be synchronized and strengthened?

Literature Review

The Grade R Policies as well as the curriculum in South Africa were made as a response to the UNDP’s vision that urged nations to drive for universal access to Grade R, sighting benefits that would accrue in language proficiency and mastery in skills across the curriculum (Heckman, 2014). The implementation of Grade R education in South Africa is anchored in the policy documents known as the Education White Paper 5 (WP5) of 2001, the ECD Service Guidelines of 2006, the Norms and Standards for Grade R funding (NSF Grade R) of 2008 which particularly spell out that Grade R should have informal structures and should be mediated through play. There have been follow up Policy documents such as and the National ECD Policy Draft 1 of 2014. However the actual classroom practicum is premised in the curriculum guidelines frameworks (Curriculum and Assessment Policy Statement, 2011) crafted for all subjects which closely detail how educator practices should be carried out step by step.

Policy regulatory prescriptions that apply to practice to the Grade R learning environment and programme implementation in South Africa as articulated in CAPS, 2011 Mathematics.

Fostering cognitive, social, emotional and self-regulation development

A supportive learning environment is enacted to cultivate cognitive, social, emotional and motivational aspects of individual learners’ makeup (Oliver & Weischly, 2011). Such an environment sharpens a learner’s cognitive competencies, facilitates social, emotional and motivational aspects so that the individual becomes both mentally productive as well as behaviorally adjusted citizen (Evertson & Weinston, 2006; Hattie, 2009; Koppershoek, Harms, de-Boer, Kujik & Doorland, 2014). There is well documented evidence that by age 5 some learners show lack of skills necessary for successful navigation of the curriculum (Orbele Schornert, 2013; Pianta et al., 2009). Such skills as paying attention, remembering what has to be taught and getting along with peers. This calls for the educator to engage in mind
developing mathematical concepts presented in problem solving challenges and self-regulation training strategies. (Oliver & Weischy, 2011; Durlak et al., 2011; Solomon, Klein, Hintze, Cressy & Peller, 2012). Self regulation enables a learner to monitor, and manage thoughts and emotions in a socially acceptable way. The learner will be able to track and control emotions and thoughts before making spontaneous actions that may be disruptive in challenging or exciting moments (Savina, 2014; Moffit, Arseneault, Belsky, Dickson, Hancox, Harrington, & Caspi, 2011; Spinrad, Eisenberg, Cumberland, Fabes, Valiente, Sherpherd, & Gutherie, (2006)). The learner will be able to make acceptable choices and interact with peers Self-regulation enhances self-control enabling a learner to override explosive and impulsive emotional behaviours which are reignited and kept in check because the learner evokes inhibitory control (Moilanen, Shaw, Dishon, Gardner & Wilson, 2010; Flook, Goldenberg, Ping & Davidson, 2015; Rees & Galvin, 2009). Educators are strategically positioned in a space to train learners in social and emotion management as well as model and exemplify such behaviour which reinforces it to learners (Slavin, 2014; Berkman, Graham, & Fisher, 2012; Posner, & Rothbart, 2007; Muraven, 2010). Play is particularly used at Grade R level to promote self-regulation because it has rules that must be adhered to and negotiated while teaching the learners to learn to take turns and observe fair play (Robson, 2010; Newton & Jenvey, 2011; Whitebread, Coltman, Jameson & Lauder, 2009; Blair & Diamond, 2008). Self-regulation is acquired in overly regimented classrooms or in situations where learners are not availed with opportunities to make choices but where the learners are free to make choices and decide on options they prefer to take (Pianta et al., 2009; Diamond & Lee, 2011).

Skill Focused and Meaningful Activities

The mathematics Grade R curriculum is very clear that Grade R learners are not supposed to be occupied in a baby sitting situation as if keeping them safe till parents can collect them DBE, 2012. They are supposed to be in programmes that engineer school readiness by equipping them with logic developing pathways using purposeful and appropriate activities that stimulate their innate abilities to do mathematics (DBE, 2011; Graven & Heyd-Metzuyanim, 2014; Heyd-Metzuyanim & Graven, 2015; Graven, 2015 Clements & Sarama, 2012; Feza, 2012). Further it is critical that the 5 dimensions of numeracy proficiency highlighted by Kilpatrick, Swafford and Findell (2001) considered to be by crucial dispositions and adopted by Graven & Metzuyamin (2014; 2015) have to be targeted in well selected activities. With the Basic comprehension that there are principle and deposition guided imperatives in lining up activities, educators are expected to provide the experiences and opportunities that stimulate acquisition of cognitive and prosocial interactions (New Jersey Department of Education (NJDE), 2014; DBE, 2012; Graven & Heyd-Metzuyanim, 2014; Heyd-Metzuyanim & Graven, 2015; Graven, 2015). Critical thinking can be fostered in participatory activities where learners respond to questions and outlined problems, where they get opportunities to explore and represent their experiences through model construction, drawing, painting and verbal as well as written exposition and play (NJDE,2014; Feza, 2012 DBE,2011; Clements & Sarama, 2012 Graven & Metzuyamin (2014; 2015).

Grouping of Grade R Learners

While there is a guide of how grouping should be done, grouping of Grade R learners is not prescribed and remains the prerogative of the educator who must consider the tasks targeted by the lesson to arrange the class. However some principles should be considered such as the diversity or homogeneity of the group, the capacity levels of operation of the learners and their self-control abilities. Learners experiencing barriers, those in the highflyer range and the average may be grouped separately (DBE, 2011).

Planning Imperatives for Small and Large Group Activities

When the decision to group learners has been taken, planning for small and large groups becomes crucial for grade R. The Caps mathematics curriculum directs that the educator must start children off with intense close interaction where a small group of learners get attention and demonstration of the activity the teacher has planned to take them through (DBE, 2011; DBE, 2012). It is only after that that the learners operate from a larger group because they can then work without intense supervision albeit with the teachers arms-length monitoring DBE, 2011; DBE, 2012. The educator must have an idea of the concept or skill to be developed in the particular selected activity or lesson (DBE, 2011). The educator should consider whether the objective of the lesson can be achieved in small group facilitation where learners have to cooperate to achieve it or not. If small group learning is appropriate, then the learners have to be taught to listen to one another and take turns to speak, and to present work from all their effort rather than from one individual (DBE, 2011). They also have to be helped to stay on track because cooperative learning takes a long time and learners can easily disengage.

For large groups, the educator should make an appraisal of the overall skill operating level of the group and knowledge of its diversity (DBE, 2011). As such, the fact that the learners can easily disengage, can become overly competitive with destructive consequences and that some individuals can easily dominate must be taken into consideration (Moilanen, et al. 2010). In large groups, learners must have clear step by step guide of what they should be doing (DBE, 2011) and the time allocated must be adequate to accomplish the task without being too much to allow rowdy distractions and behaviour (DBE, 2011).
Active Learner Participation

Learners are expected to participate verbally and practically to demonstrate their knowledge and skills as well as exhibit their work in writing.

Mathematics to be Play Based

The department of education also took a positon to make it a requirement for grade R learners to learn Mathematics in play (DBE, 2011). However this decision is heavily supported by research which shows that play is not to be taken as a relief from serious learning (Ginsburg, 2007) but that it gives chance for development of a multiplicity of skills such as social interaction, emotional self-control, and physical agility (Miller & Almon, 2009, Whitebread, 2010). Play gives opportunity for brilliant mathematical solutions to problems, creativity, cooperation and negotiation which builds acumen for a fully functional and well-adjusted citizen who will be well grounded in the community (Milteer & Ginsburg, 2007; Ginsburg, 2012; Graven, 2015; Graven & Heyd-Metzuyamin, 2014; Bedrova & Leong, 2007).

Role of Educators

The educator is critical in any learning enterprise because there is need for all dimensions of learning to be meditated and the facilitated (Clements & Sarama, 2008; Mashburn, Pianta, Hamre, Downer, Barbarin, Bryant et al., 2008). The educator is expected to be both proactive in initiating some activities but also in taking a pause and allowing learners to opt for preferred activities and then join in to mediate those where learners need facilitation (Clements & Sarama, 2008, Korpershoek et al., 2014). This is where the educator may strategically use teachable moments to link child led activities to concepts that are mathematical (Clements& Sarama, 2008).

Informal Assessment

Learners at this level of the learning ladder should not be given formal assessment. There is need to make cumulative build-up of the development of the learner over time culminating in a full picture of attainments. The learners have to have their cognitive, social, and emotional and self-regulation assessed informally (Pianta et al., 2009). That means educator needs to make notes of how each of the learners are improving in these areas by observing their behaviour from time to time without making a test situation.

Methodology

The participants for this paper were 17 grade R educators participating in the IKS/NRF intervention project of professional development in the Eastern Cape. The data was collected using an instrument adapted from Clements & Sarama, (2008). The tool had highlights of curriculum expectations subsumed from the curriculum assessment policy statement CAPS 2011 for Mathematics and educators were asked to write how in their own views their practices were aligned or were a mismatch of the curriculum expectations as they viewed a series of their own taped lessons. They were sked further to create brief memos of their observations and comments to summarize their perceptions. This was followed by interviews of 5 purposively selected educators who were asked to give detail of their opinions and explain the way they see their own practices versus the curriculum expectations. The data was then captured in two data sets, one based on written views as expressed by the educators on the observation tool and other field notes of the follow up interviews on views of the educators on their practices, seen against the curriculum expectations.

Analysis

In the study, the two researchers separately coded data from the two data sets. The coding developed patterns. The researchers proceeded to individually write analytical memos that explained the meaning of each pattern. The researchers then compared notes on the memos and codes, supporting these with empirical evidence. The patterns that came out of this triangulation were grouped and those contrasting were also grouped separately. The groups were then put on Venn diagrams and themes emerged. The themes that were used to craft a report.

Findings

Below is the thematic report from the analysis.

Fostering Cognitive, Social, Emotional and Self-Regulation Development

Educators indicated they consciously plan and implement cognitive development of their learners using concrete manipulatives for demonstration. For example educators A, C, F and I indicated.

We develop learners for example in number concept, shapes as well as geometry. We use concrete materials that enable learners to know how many items make any particular number. This way learners are then able to count even up to a hundred as well as backwards. However we do not target social, emotional and self-regulation as lessons. Maybe happens incidentally. We do not know how to emotionally or socially teach the learners. We were never trained and this
was not covered when we were inducted. So we do not consciously develop social, emotional and self-control. It means on these issues, our practices are not aligned to the curriculum expectations.

**Use of Large and Small Groups**

The educators indicated that they create activities for the whole class as well as for small groups. Educators indicated the small groups they use will be in sitting positions with tables that sit six scattered around the classroom with the educator visiting each in turns. The educators insisted the whole class groups were easy for the educator to direct from one spot while he small groups helped them to check activities as they went round. The small groups also made class management easy. Educators also indicated that they plan the grouping based on the ages and as well as on how vigorous, playful or collected the learners are in disposition.

This practice is aligned to the curriculum expectations.

For example the following extracts were educators' words Educator A:

“I think this is the same as what the curriculum tells us to do because the curriculum says we should have large groups, and for this we teach the whole class together. The small groups are set in tables of six to ten learners. We base them on the tables and they do the activities from their bases.

**Educator C:**

We also teach the small groups which we arrange in tables. We do not have mats to teach from and we do not teach one group at a time. We tell all learners in the small groups what to do. We then visit each group to check what will be happening. The whole class is our large group and we direct the learners to do activities like count songs as a class.

**Educator F:**

The large groups make it easy to cover all the activities but the small groups make us see when learners start doing things outside the lesson. Young children are not manageable when going all over. When in groups we manage them easily. We group them according to ages and how playful and vigorous they are.

**Use of Play and Enjoyment.**

There was unanimous agreement by all the educators that they definitely used play an enjoyment to teach numeracy. This is a practice that is aligned to the curriculum expectations. This practice is packaged in songs, chorused poems that were action filled and in games. The games were varied and they were in doors as well as out of doors. Outdoor games included skipping accompanied by count songs, jumping into squares while counting and reverse counting songs. The following excerpts from the educators’ note confirm this:

**Educator B**

I use play by making learners sing tunes when counting such as ten ducks going out to play with only nine earning home. Learners dance to the tunes and demonstrate numbers with fingers.

**Educator D**

Learners play games such as skipping to song and counting while the whole class sings and claps hands urging the ones playing to do it faster! I think this practice is in line with the curriculum expectations.

**Skill Focused and Meaningful Activities**

Educators indicated that they planned activities that were targeted at developing particular concepts when they were teaching. They for example target numeracy and engage learners to count using manipulatives combined with song. They insisted they do not just play games for fun that has no focused learning. This practice is aligned to the curriculum expectations.

The following are the educators’ excerpts on his practice.

**Educator E**

When I need to teach counting I plan an activity that covers the numbers I want to teach. If I want to teach counting one to ten, I select a poem or song that covers the numbers, such as ten monkeys rolling on the bed and one falls down and then they remain nine. As the learners sing they dance and count with fingers and I think this matches what the mathematics curriculum tells us to do.
Educator H

I teach number through games such as having those in jackets standing and counting to a number such as twenty, the next lot may be those with jerseys also counting to a given target such as 40 and this game goes on till the class is done and he teams win points as they manage the targets.

Informal Assessment

All the educators admitted they did not do assessments or follow up summaries after their lessons. The educators have challenges in assessing cognitive, social, and emotional and self-regulation skills. They indicated that they have not been taught how to assess all the aspects though they were aware of the need to give reports on the learners’ cognitive development. They indicated they struggled to make reports at the end of the year to the heads of departments and made special requests for being workshopped in the area of assessments. This practice is not aligned to the curriculum expectations.

The following are the excerpts from the notes they provided:

Educator I

I really want to tell the truth that I try to give learners comments after the lessons. The problem is that HODs want a hundred marks. We were not taught how to do the assessments and I hope the workshop will help me. I find this difficult.

Educator M

I have no idea how to check progress on the social and emotional. I do not teach lessons for that. I teach counting and shapes in mathematics. So I have never assessed that.

Role of Educators

Educators viewed their roles as critical in facilitating learning. Their reaction to how they carried that role was however partly in line with the curriculum expectation on the aspect of proactively initiating, supervising and organizing the learning environment, but they were out of line with the aspect of making the learning educator centred. The curriculum expectations urge the curriculum implementers to be learner centred. The educators insisted giving learners choices caused the learners to be unmanageable. They said if every learner was given opportunity to make preferences on terms of activities hey would not be able to manage he classes or maintain routines which they said were a useful organizational strategy.

The following were the excerpts from their notes on this aspect

Educator (B)

The Grade R class is very large in the school. It is not possible to give every child a preference of activity because they may not choose an activity they like. The class would be unmanageable. I maintain control and give instruction on what activities to do, when and when to stop. Learners could otherwise prefer to play and not do mathematics.

Discussion

This practice partly matches the curriculum expectations in that the curriculum advocates large and small groups be used to each Grade R level learners. However where it slightly differs is that the curriculum specifies that the small groups should be for intense interaction where the educator takes a small group to a mat and intimately demonstrates, and explains a concept or skill and the learner has a chance to display hoe he she is following in practical ways.

Conclusion

The findings revealed that according to the educators, they view some of their practices such as skill focused and meaningful activities, use of large and small groups, use of play and enjoyment and use of skill focused activities as being aligned to curriculum expectations. They however viewed some of their other practices such as fostering cognitive, social, and emotional and self-regulation development, informal assessment and their practice of teacher directed and teacher centred activities as a mismatch to the curriculum expectations.

Recommendations

The paper recommends professional development to strengthen the practices that are not aligned to the curriculum as viewed by the educators themselves such as fostering cognitive, social, emotional and self-regulation development, informal assessment and their practice of teacher directed and teacher centred activities which need to be synchronized and strengthened.
References


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