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Reflections of video enabled ECD educator' practices in strengthening professional development

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Abstract
Practices of Grade R educators as they teach mathematics are beset by multiple challenges documented to include overcrowding, poor orientation in cognitive pedagogies, and lack of professional training in handling large classes. This paper focusses the vintage strategy of using digital video technology to access authenticated volunteered video clips of practices of educators for which the dilemma of exposure to unaffected classroom practices would have been hard to overcome. In order to interrogate these issues, the study was guided by the questions: (i) What video enabled practices are revealed in the teaching and classroom management of grade R educators? (ii)What theory-to-practice linkages become apparent as educators reflect on their video enabled teaching? Data was obtained from a series of four video lessons per class volunteered by the fourteen Grade R educators using an adapted COEMET tool by Clements & Sarama to assess the quality of their teaching. A thematic analysis approach was employed in analysing the captured lessons. Results indicate that using digital video technology has rear advantages such as enabling educators to reflect on their practices and where these were positive such as early preparation of adequate manipulatives, the practices were strengthened. It also emerged there were negative practices such as poor engagement of learners, and poor use of play. Through educator reflection challenges were efficiently addressed and professional development on these issues was accomplished.

Keywords: Authentic Educator Practices, Digital Video Technology, Linking Theory to Practice, Mediation of Learning

1. Introduction
Practices of Grade R (Reception Class) educators in South Africa in teaching mathematics are beset by a multiplicity of challenges documented to include overcrowding (Tlou and Feza, 2017) [46], poor orientation in learner cognitive developing pedagogies (Artmore, Van Niekerk & Ashely-Cooper, 2012; Biersteker, 2013; Spaull, 2013 & Richter, Biersteker, Burns, Desmond, Feza, Martin, Saloojee, & Slemming, 2012) [4, 45, 38] and lack of professional training in handling composite classes (Tlou and Feza, 2017) [46]. In addition, even where theory has been taught to develop would be educators, aligning it to practice remains challenging for them (Newhouse, Lane & Brown, 2007; Wren & Wren, 2009, Major & Tiro, 2012) [35, 30]. This becomes an insurmountable challenge when educators trained in short workshop courses are expected to step into a crisis management zone where they must teach large classes without any prior experience or apprenticeship. It is in such situations that use of video technology is seen as a powerful tool to rope in, to enable educators not only to view their own practice in situations that allow reflection and analysis but provide opportunity to engage in contextual on-site professional development (Seidel & Stürmer, 2014) [41] A lot of studies have been done that reveal the multifaceted nature of challenges faced by some inadequately trained Grade R teachers in this sector. Recent literature has seen a surge in studies that seek to empower them with on-the-job training on the heightened use of manipulatives and concrete media (Clements & Sarama, 2014; Spaull & Kotse, 2014; Feza, 2015 & Milton, Flores, Moore, Taylor, & Burton, 2018) [9, 19, 33]. However not much has been done to reflect inadequacies in technology enhanced pedagogies, although a start has been initiated such research (Feza & Tlou, 2017) [46]. This paper adds to the sparse yet much needed literature on the aspect of video technology empowerment which could enrich their development.

The concept of a video enabled teacher
In this paper, a video enabled educator is viewed as one who is highly reflective and aptly aware of the value of video technology in teaching. Such a teacher is technologically oriented and has the disposition and propensity to adopt technology

when it is considered useful. Video technology is particularly attractive for this context because it has strong attributes that are useful in training situations. The fact that video uses digitally recorded content to convey visual images accompanied by sound and delivered live through various devices is highly captivating (Woolfitt, 2015; Bates, 2015) [5].

2. Theoretical framework

This paper draws from the technology readiness and acceptance model (TRAM) adapted from Lin, Shih & Sher (2007) who further developed the technology acceptance model (TAM) by Parasuraman (2000). The model has two dimensions, one on technology adoption readiness which shows such personal traits as innovativeness, usefulness and ease of use as supportive to technology adoption. The other dimension is on inhibition of technology adoption for those with such traits as discomfort, insecurity and fear of failing to use new technologies. It is the s dimension enhancement of technology readiness that is relevant to this study, which highlights reflective teachers inclined to adopt videos for their teaching in a self-reflective and critical way.

Literature Review on the value of Video aided learning and a technically video empowered grade R educator

Attention driving force

Videos ignite a strong attention driving force which arouses interest because they forecast colourful concrete images of people in action (Towers, 2007) [47]. They pick the slightest movements and detail all actions even if it is body or facial expressions and convey messages and meaning out of them. As a result, all actions of the educator are captured and availed for viewership enabling self-reflection.

Simultaneous address to more than one sense

Video enabled technology simultaneously addresses both hearing and sight senses. This is a powerful combination that appeals to human intelligence as the supplied information can be fully considered and reactions produced in real time (Alaroini, 2005, 2012) [3, 2].

Allows self-reflection

When classroom activities have been captured on video, they are available for several runs as one can stop the tape at any particular point to scrutinise action, reverse it, to review occurrences and fast forward it to verify detail (Alfar, 2009) [1]. That allows educators to have clarity on actions that transpired and debate as well as reflect on them**.**

Feedback is timely

The use of videos allows educators and training experts to interact with actual scenarios and practices in view so that feedback is immediate and given in real time. That enables the educators to link the practices with the theory and adapt as well as adopt corrective measures. This allows linkages between theory and practice often proven to be challenging (Alfar, 2009) [1].

Sets up an interactive platform that brings issues to plain view

When an educator is busy teaching, it may not be possible to make an appraisal of the effects on learners of the concepts she or he explains. In fact, the whole choreography of movements and actions both in verbal and nonverbal terms may be lost to the educator but impacts the learners. Thus, the practices educators' model is critical to the learning context. Video technology can bring to plain sight issues about the nature of one's teaching to the educator as no other way can (Seidel *et al*., 2012; Bloomberg *et al*., 2014) [7]. The video is so convincing because it is not acted, it is real life and the educator may for the first time see him or herself doing what they never knew they do.

Enables access to lessons that would otherwise have been very difficult to observe.

Going to observe teachers in the classroom is not always easy in South Africa (Mafisa, 2017) [29]. Unions such as the South African Democratic Teachers Union (SADTU) and powerful umbrella bodies to which other unions including teacher unions are affiliated such as the Congress of South African Trade Unions (COSATU) protect their members from scrutiny they view as putting the members to risk and vulnerability (Ntshangase, 2001) [36]. If observations include teaching on camera, this is considered more threatening hence even more difficult to achieve. Ethical clearances also involve departments that own the schools, making permissions difficult to obtain. When teachers voluntarily video tape lessons for professional development, a rear window to view classroom activity opens, one in which the teacher feels relaxed and unaffected by prying eyes and therefore acts naturally without rehearsing so that practices modelled are authentic (Tlou & Feza, 2017) [46].

Professional development

Educator competencies do not just happen without deliberate attempts to equip the intending classroom practitioners with mediation skills and dispositions for classroom practice. Professional development thus must be engineered through training programmes. In addition, in-service workshops may also be created to fill gaps that may exist by using video enabled technologies to enhance reflection and enrichment (Bloomberg, *et al*., 2014) [7].

Professional development is the pivotal vehicle charged with shaping teachers into classroom practitioners. It has to capacitate teachers in three key competencies, namely, knowledge content that details concepts in the subject area, pedagogic skills for instructional delivery and character dispositions for handling learners in ethically accepted ways (Mitchell & Cubey, 2003; McDiarmid & Clevenger-Bright, 2008) [34, 32].

Importance of educator mediation

The role of the educator as a mediator is not only pivotal but absolutely critical to the intellectual development of the learners and how they follow appropriate pathways of knowledge acquisition. Clements & Sarama (2009, 2014) [11, 9] place the educator at the centre in the process of guiding and unlocking the learning pathways for mathematics skill acquisition. Feza & Diko (2013) [20] also insist that if not properly mediated, learners can fail to successfully navigate their way and follow pathways that enable them to make correct associations leading to them acquiring mathematical knowledge. Vygotsky (1978) [48] in his social learning theory insists that the educator is the expert who identifies the actual level point at which the learner is operating which he names the zone of proximal development (ZPD). It is at this point that the educator aims the instruction at the correct level It is this is scaffolding of knowledge that stimulates the

learner to make connections that build competencies to accomplish tasks (Feza, 2012a, 2016) [16, 21]. This is the rationale that makes it imperative for educators to be empowered to know the correct practices and activities that actually develop learner competencies. Self-reflection through video enabled technology thus becomes a vital relevant strategy.

Content Knowledge

This is the part where educators are engaged in cognitive development within a subject area to make them well apprised of key concepts in particular subjects. They are empowered to unpack content knowledge that is prerequisite and endemic to a subject (Clements & Sarama, 2009, Feza, 2012a, 2013) [11, 16, 17]. In mathematics educators have to know the vocabulary that is basic for the level of class they train for and have good grounding in core topics in number sense. These include verbal or rote counting, object or one to one correspondence, cardinality or the knowledge to answering the how many items question, reverse or backwards counting, and subtising which is a quick one sweep recognition of how many items there are. Educators have to develop specialisation so that they comprehend the content knowledge so well they can unpack the underlying concepts and exemplify them in concrete and practical ways (Feza, 2013, 2015; Kühne, O'Carroll, Comrie, & Hackman, 2013) [17, 19, 26].

Pedagogic skills

There is overwhelming evidence from research that the manner in which young children learn mathematics vastly differs to the way older children and adults learn it (Clements & Sarama, 2010) [8]. This is because the way children view and interpret ideas is different to the way adults do. Hence the way mathematics should be taught to children at an early age is of critical importance since it is imperative that presentations take into cognisance appropriate learning progressions for children at an early age such as Grade R (Clements & Sarama, 2010, Kühne, Lombard & Moodley 2013, Kühne, O'Carroll, Comrie, & Hackman, 2013) [8, 27, 26] Young children follow particular progression trajectories from simple going on to more complex ones (Clements & Sarama, 2010, Kühne, Lombard & Moodley 2013) [8, 27]. It is for that reason that educators must present mathematical concepts to Grade R learners in pathways and progressions that match their developmental ability. If not adhered to, that can break their abilities (Clements & Sarama, 2010, Kühne, Lombard & Moodley 2013) [8, 27]. Feza (2013) [17] also emphasizes the need for ensuring a stimulating environment for mathematics learning at this age as an imperative. Thus, a lot of planning in providing materials such as manipulatives and setting up for a lesson well before it begins becomes a necessity (Feza, 2013, Clements & Sarama, 2010, Kühne, Lombard & Moodley 2013) [17, 8, 27]. Managing the class during the learning also calls for an educator with organisational skills or else children get into disarray pursuing different interests as young ones are inclined to do resulting in chaos and little if any learning (Tlou & Feza, 2017) [46].

3. Methodology

The study adopted a qualitative approach which was used to gain insights into the classroom mediation practices and skills of Grade R educators. Qualitative inquiry was suited to the study whose focus was to tease out views of educators on their own teaching as shown on videos. The strength of the approach was in revealing reflections, connotations, and evaluations by educators of their own practices (Creswell, 2013) [14]. The Data from video educator reflections was buttressed by interviews of 5 purposively selected educators employed as triangulation.

The study Context

The study was conducted in the Eastern Cape, in primary schools with isiXhosa as the learners' home language. The educators involved in this study were not formally trained but had been preschool practitioners who were then recruited to teach Grade R. At the time of the study the educators were also involved in a professional development programme and had a level 4 preschool qualification. Six of them did not have a national (high school) certificate.

4. Research Design

Seventeen educators included in the study voluntarily selected a series of 5 lessons they wanted to showcase for the research and submitted 5 videos each for data collection. However only 3 lessons per educator were captured due to poor taping. A tool with highlights of practices of educators in terms of classroom management, pedagogic skills and assessment aspects revealing dispositions of educators was given to educators. The educators were asked to critically reflect on their practices as seen on video, writing brief memos of their impressions to indicate their perceptions. This was complimented by interviews of 5 purposively selected educators who were asked to give details of their opinions to explain the way they saw their own practices versus principles they were taught in professional development workshops on the three aspects of classroom management, pedagogic skills and assessment aspects. They were alerted to the fact that they were free to These two data sets were separately annotated and then the two sets of annotations were triangulated. The patterns that came out of this triangulation were grouped and the contrasting patterns also grouped separately. The two group sets were then put on Venn diagrams and themes that emerged consolidated into a report.

5. Findings

Video based reflections showing positive mediation practices:

Some educators set the classroom well before mathematics exercises began and ensured all learners had adequate manipulatives differentiated by colour from those next to them. Educator F had an orderly lesson with very attentive learners who watched demonstrations and got the instructions clearly. In their small groups, learners demonstrated they could successfully do the task ((Feza, 2012a, 2016) [16, 21]. On self-reflection, educator F was buoyed that preparation and the clear instruction had got her learners to successfully demonstrate understanding of the concept of counting (Feza, 2015) [19]. The following is an excerpt from the note's educator F provided:

> *The preparation, demonstration at each table with a small number of learners and the repeated clear instruction made the learners get it right. It is plain to see as I went over my own video.*

Video based reflections showing weak mediation practices

Some educators had poor abilities for multi-tasking in order to engage all learners at the same time. As a result, while energetic out of sync learners started to play games that were not related to the lesson, there were occasions when the educator continued to explain difficult concepts in crowded large classroom. Videos revealed that there were several occasions when the educator involved some of the learners while others did their own thing (Tlou & Feza, 2017) [46]. Common in such disengagement situations were learners attacking others, learners forcefully grabbing manipulatives from other learners in order to possess many even when they did not go on to use them. This has also been shown to occur when an educator is unable to have engaging practices and intense connection with learners (Tlou & Feza, 2017) [46]. When this was viewed on video, educators realised their failure to fully engage and control all learners all the time and discussed how they could improve. This became a teaching moment to link the educators to the theory so that they could be alert to fully engaging all learners all the time, especially by strategically placing learners in groups, table by table. As educator B reflected on this aspect she remarked:

> *I definitely did not seem to have managed to engage all learners which gave a boy who likes bullying others a chance to start snatching balls from other learners causing commotion. I need to be positioned where I see most learners and to sweep my gaze around more often and be alert to all behaviours all the time.*

Inability to teach concepts meaningfully

Videos also revealed lessons dominated by memorisation and recitations of counting poems. On reflecting on these lessons, educators noted that after all the memorisation and recitation, when asked to count using manipulatives, learners did not make the meaningful one to one correspondence connections. This has been explained to occur by (Clements & Sarama (2010), Kühne, Lombard & Moodley 2013) [8, 27] in their studies of learner progression pathways. On taking a close look and reflecting on their own teaching educators realised they needed to use manipulative for stimulation directed at making meaningful associations in counting leading to the meaningful intellectual development of associating a number with items. On exploring their teaching on video and looking at it reflectively some educators like C realised they had not effectively mediated on the principle of concrete representation by using manipulatives to enable learners to intellectually develop meaningful associations of one-to-one correspondence. On making this observation educator C said:

> *Teaching counting using manipulatives is easier and effective compared to the recitations and singing. With singing they do go over counting numbers but do not gain the knowledge of the items each number represents as in one-to-one correspondence.*

Purposeful play

The videos also revealed while there were cases where games and play songs were used appropriately for teaching number there were also cases where play was not used to convey mathematical concepts. Research is clear that play is a powerful strategy that can be harnessed easily to develop children's learning because it comes naturally to them (Cohen, 2006; Copley & Oto, 2006; Feza, 2013) [12, 13, 17]. However, experts insist that in learning situations it has to be used constructively in order for it to engineer intellectual concept development (Drew *et al*., 2008; Jung, 2011; Richter *et al*., 2012) [15, 23, 38]. In the case of lessons in the study educators' videos, learners were made to sing and recite poems that did not have anything to do with the lesson on mathematics. This is also highlighted by some experts who have alluded to some educators of early childhood learning as having misconceptions about how children learn (Lee & Ginsburg, 2009; Feza, 2013) [28, 17]. Inappropriate activity wasted a lot of time and was not gainful. Reflecting on this aspect educator E remarked:

> *Sometimes we just made learners sing but did not use the songs that teach counting. In my lessons learners sang a lot but a lot of the songs I made them sing were not counting songs during the mathematics times. Learners did enjoy themselves but the song choices could have been better selected and more gainful.*

6. Discussion

This article highlighted the actual strengths and weaknesses exhibited by this group of educators undergoing the professional development. After viewing their own lessons on video and reflecting on them educators gained knowledge of their own competencies and weaknesses. What came up as a powerful strategy in this study was that educators actually could not believe some of the mistakes they had allowed in their teaching. There were cases where this realisation made the educators feel like they knew better than to teach the way videos revealed. Research supports the fact that watching own video lessons heightens motivation because it also ropes in the scenarios as they had played out in class with the actual mediation instructions the educator had given (Kersting *et al*., 2012; Siedel *et al*., 2012) [25]. One positive issue that emerged in their practices was that there were educators who prepared materials and the class setting of putting learners in groups table by table. At those points when educators paused the video and reflected on an aspect, the educators were encouraged to see that this particular practice enabled very effective mediation. This is also supported by research Sherin (2007; Sherin & van Es, 2009) [43, 44] who argue that when educators watch real classroom lessons, they indulge in intense analytic processes and these are reflective. It also emerged that other educators could not engage all learners in some lessons hence those learners gained nothing in the lessons in question. On reflecting on their own mediation, educators noted their shortcomings and in the workshop discussions that followed, realised they could improve their classroom management practices, thus creating an enabling environment for effective mediation (Kersting, 2008; Feza, 2013) [24, 17]. This paper also raises the practice by some educators who used ill-suited activities such as songs and recitations that did not engineer targeted intellectual development. Whereas the aim in such cases had been to unlock cognitive development that fosters connections in learners leading to competencies such as the associations that create one to one correspondence, this did not happen and it surfaced in the study that most learners could only read verbally. Reflecting on this practice,

educators acknowledged this as a weakness and sought insights on improving their selection of activities as well as better suited mediation practices. What was also unique in this study was that educators revealed authentic results that were noteworthy in terms of the extent of frankness. This was seen in the fact that where errors were made, they were presented without censorship. In other circumstances such errors could have been hidden by educators to shield themselves from embarrassment. The voluntary offer to showcase uncensored videotaped lessons for discussion showed educators' heightened maturity and commitment to harness the opportunity to reflect on their practices without feeling that their reputations and feelings were bruised. This is a huge advantage of using video enabled technology.

7. Conclusion

The fact that some of the Grade R educators teaching subjects like mathematics sometimes do not fully comprehend concepts of numeracy has long been raised in research by such scholars as Feza, (2013); Spaull (2013) & Artmore, Van Niekerk & Ashley-Cooper (2012) [17, 45, 4]. In the South African context poor performance in mathematics surfaces in later grades and has been attributed to poor foundational knowledge in early education (Clements and Sarama 2011; Feza 2013; O'Connell, Fox, Hinz & Cole 2016) [17, 37]. It is evident that this situation can no longer continue to go on unheeded. Researchers have aptly called for more consolidated and comprehensive professional development programmes of those practitioners who were not formally trained but continue to soldier on with commitment (Ginsburg, Lee & Boyd, 2008; Richter *et al*., 2012) [22, 38]. What is now apparent is that by their own admission upon reflection of their practices, some educators also acknowledge the need for their re-skilling through in-servicing (Tlou & Feza (2017) [46]. This may be the remedy that may contribute to the success in the performance of learners in national examinations that has so far eluded the nation.

8. Recommendations

The study strongly recommends use of video technology in the training of educators during their professional development. This study reveals a lot of advantages and opportunities accrue when educators voluntarily tape their own lessons and submit them for training purposes. This provides great opportunities for reflecting on their own teaching.

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