GRADE R NUMERACY COMMUNITIES: THE POTENTIAL FOR TEACHER GROWTH

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This paper provides a summary of a larger research project investigating Grade R teacher participation in a newly-established numeracy focused community of practice (CoP). The larger study has as its focus the evolving nature of teacher identity, examined through a socio-cultural theoretical perspective and drawing on Wenger's (1998) theories of learning. Here, I present a brief policy and literature overview of challenges currently faced by South African Grade R teachers, and ground this in initial findings and preliminary analyses drawn from the first stages of the larger study. I use these discussions to advocate for the provision of opportunities to participate in professional learning communities and communities of practice for Grade R teachers in particular, and argue for these learning opportunities to be tailored specifically to the needs of the Grade R community of teachers.

Key words: professional identity, community of practice, situated learning

INTRODUCTION

This paper reports on a larger ongoing study which is investigating Grade R teachers' evolving ways of being, making meaning and changing identity through participation in a newly-established numeracy community of practice (CoP). A continuing literature review indicates that teachers' professional identity and subsequent teaching practices benefit significantly from the collegial exchange of ideas and resources through the medium of a community of practice (see for example Graven, 2004; Hoadley, 2012; Little, 2002; Richardson, 1998). While there is some local research on the value of teacher communities for supporting teacher learning I have found no local research on pre-school teacher communities? Thus a gap exists as to insights into the nature of teacher learning for pre-school teachers participating in learning communities.

The focus of the larger study is on Grade R teacher learning specifically, as firstly, the South African Numeracy Chair Project (SANCP) Early Number Fun (ENF) CoP – which forms the empirical field of the larger study - is directed at Grade R teachers and secondly, Grade R teachers have essentially been 'plucked' out of the pre-school setting, and bolted onto the Foundation Phase landscape of schools due to the recent roll-out of Grade R policy by the Department of Basic Education in South Africa. There is potential within this transition for changing ways of being and making meaning, providing a potentially data rich space within which to conduct research around the nature of teacher learning. My role within the larger project is to investigate teacher learning through the theoretical lens of Identity, based on the work by Lave and Wenger (Situated Learning: Legitimate

peripheral participation, 1991), and Wenger (Communities of Practice: Learning, meaning and identity, 1998).

For this paper in particular, I focus on one aspect of learning and resultant evolving identity, namely participation, as "participation is a source of identity" and "participation in social communities shapes our experience" (Wenger E. , 1998, p. 56). Because the act of participation in its most fundamental manifestation is integral to learning within these communities, I argue here that opportunities, for Grade R teachers in particular, to participate in learning communities is fundamental to the growth of these individual teachers, as well as to the journey towards providing 'quality' education within their classrooms.

This paper will first discuss briefly the context in which Grade R teachers in South Africa currently find themselves. This discussion will highlight major policy and documentation relating to Grade R teacher status and context. Challenges facing these teachers will be highlighted. These challenges will be discussed in terms of the relevant literature, and will be grounded in initial baseline findings and preliminary analyses of data, collected through questionnaires and interviews conducted with Grade R teachers participating in the SANC ENF program.

CONTEXT

As has been widely discussed and reported, the broader educational landscape in South Africa is one in crisis (Fleisch, 2008; Bloch, 2009; Spaull, 2013). This crisis is reflected in mathematics education (Graven, 2013; Spaull & Kotze, 2015), especially as it relates to the continuation of social inequalities and continues to disadvantage those most vunerable in our society (Hoadley, 2007; Spaull N. , 2013). In order to better understand and address the challenges within education, researchers locally and internationally have turned their focus on the early years of schooling, including Grade R (Atweh, Bose, Graven, Subramanian, & Venkat, 2014).

As more studies emerge that advocate early intervention for later school success, policies are changing in order to acknowledge and support the need for compulsory Grade R education for all children. Although Grade R has featured in curriculum documentation since 1994 (post-apartheid) (Barnard & Braund, 2016); the Action Plan to 2014 was the policy which required that every government school across the country must offer Grade R, as it is now officially a compulsory grade (DBE, 2011).

This was a significant step towards providing access to Grade R instruction:

> "In eleven years, from 2001 to 2012, the number of Grade R places nationwide has increased significantly both in the public and independent sectors. This increase more than tripled the numbers as they went from 242,000 available Grade R places to 768,000 places; resulting in a situation in 2009 where 78% of 5 year-olds nationally were enrolled in a pre-Grade 1 programme of some sort"
>
> (Van der Berg et al., 2013, as cited in Long, 2015, pg. 19)

However, as is the case across all levels of education, access is not the end of the struggle; and the issue of 'quality' is now in focus: "If early intervention is to have beneficial consequences for children's learning and development, it should be of a high quality" (Excell & Linington, 2011, p. 4). 'Quality' of teaching and learning is an often contested and hugely complex definition (Spaull, 2013), but here it is used to describe the development of sound understanding of foundational mathematical concepts by the learners and the teachers.

The issue of 'quality' is a serious one, as

> "the majority of children experience severe shortfalls in the kind of learning experiences that they are exposed to in the years before they enter formal schooling. In many cases, shortfalls happen when learners enter formal schooling are compounded by the quality of the learning experience in schools" (Green, Parker, Deacon, & Hall, 2011)

CHALLENGES

Infrastructure and resources

Many factors have and continue to influence the 'quality' of education provided in these Grade R classrooms. Firstly, not every school has had to build a new classroom or employ new teachers in order to comply with the 'roll-out' legislation. Many schools already had long- established (and often fully functioning) Grade R programmes. The implications of this are two-fold:

Some established classrooms are old, and neglected. Some however are well-resourced and have benefitted from many years of support from the school, the SGB, and the community at large. This results in Grade R classrooms from different schools beginning their 'official' Grade R journey on very different footing.

Conversely, some schools were tasked with building a new structure and stocking it with resources. This again resulted in disparities between schools. For example in relation to the Grade R teachers participating in ENF and in my study – one local school has a new brick structure and a qualified Grade R teacher appointed – she was given permission to stock it as she saw fit. Although working to a budget, the budget was significant and her classroom was ready and conducive to learning on the first day of school.

Although established at the same time, another school in my study currently has its Grade R classroom still being housed in a temporary structure, with holes appearing in the roof and walls, and the teacher there fearing that her resources will be damaged by the elements, or even stolen. She has been promised that building on a permanent structure will begin sometime in 2017. She has received furniture for her classroom, but explained that it was inappropriate for Grade R learners (too small, uncomfortable, and not enough) (Interview 1.1, 24 May 2016).

Of the 17 schools (represented by 23 teachers) who participated in the baseline questionnaire in April 2016, four have Grade R classrooms housed in temporary structures. But as of November 2016, it is "illegal for any school in South Africa not to

have access to water, electricity or toilets, and for any school to be built of wood, mud, asbestos, or zinc" (Equal Education, 2016). Of these temporary structures, one is in good condition, and although small, is reasonably resourced.

Of the remaining 13 schools (housed in permanent, established buildings), five are well-resourced, three are 'reasonably resourced' and four are badly resourced (one school was not visited) (Researcher's Interview Journal, 2016).

For this study, a classroom is considered "well-resourced" if there are enough tables and chairs for the learners; if the walls are adorned with posters; if there is evidence of a wide variety of games and other manipulatives for the children to use; if stationery is available for all of the children; and if the teacher has a collection of her own support material. "Reasonably resourced" is used to describe classrooms with basic resources, such as tables and chairs, a few posters, there are some (maybe one to two shelves worth) of games and manipulatives, and children are seen to be sharing stationery. These resources are also often judged to be worn, and in need of updating. Finally, "badly resourced" refers to a lack of any of the above elements within the classroom.

One of the teachers commented in the baseline questionnaire (April 2016) that her resources were severely depleted as her classroom was broken into twice over the previous year, and everything stolen.

The following is an extract from my researcher's journal which describes one of the schools visited:

> "Evidence of ENF resources: posters and flashcards. Very under-resourced. Plastic tables and chairs. Hand-made posters, but not much equipment. Plastic toddler slide and carpet put away in corner (no space). Mostly workbooks dotted around. Has feeding scheme."
>
> (1 June 2016)

The findings in this respect echo the state of infrastructure and resources across the country. A recent report conducted by NGO Equal Education reports:

> "What we found in the Eastern Cape were crisis conditions. We visited schools suffering appalling infrastructure. Some schools were substantially or entirely made of inappropriate materials or had no access to water or electricity. In total 17 of the 60 schools we visited constitute an outright violation of the three-year Norms and Standards deadline. The findings regarding these 60 schools do not just represent individual cases of failure. Rather, they illuminate the depth of systemic failure in Eastern Cape Education" (*emphasis in original*).
>
> (Equal Education, 2016)

The reason access to substantial infrastructure and adequate resources is a concern for mathematics learning and teaching is discussed most recently by Graven & Venkat in their chapter entitled "Changing Teaching Through a Resources Approach" (Graven & Venkat, 2017), and the use of resources is widely supported, in the learning of mathematics (Onyango, 2014; Post, 1981), as well as in the training of mathematics teachers (Adler, 2000). It is further advocated in the South African Curriculum and Assessment Policy

(DBE, 2012). However, the dearth of resources in many of the classrooms was expressed in the baseline questionnaire from April 2016, as the following chart shows responses to the question: "*What resources do you have in your class for supporting numeracy learning?"*

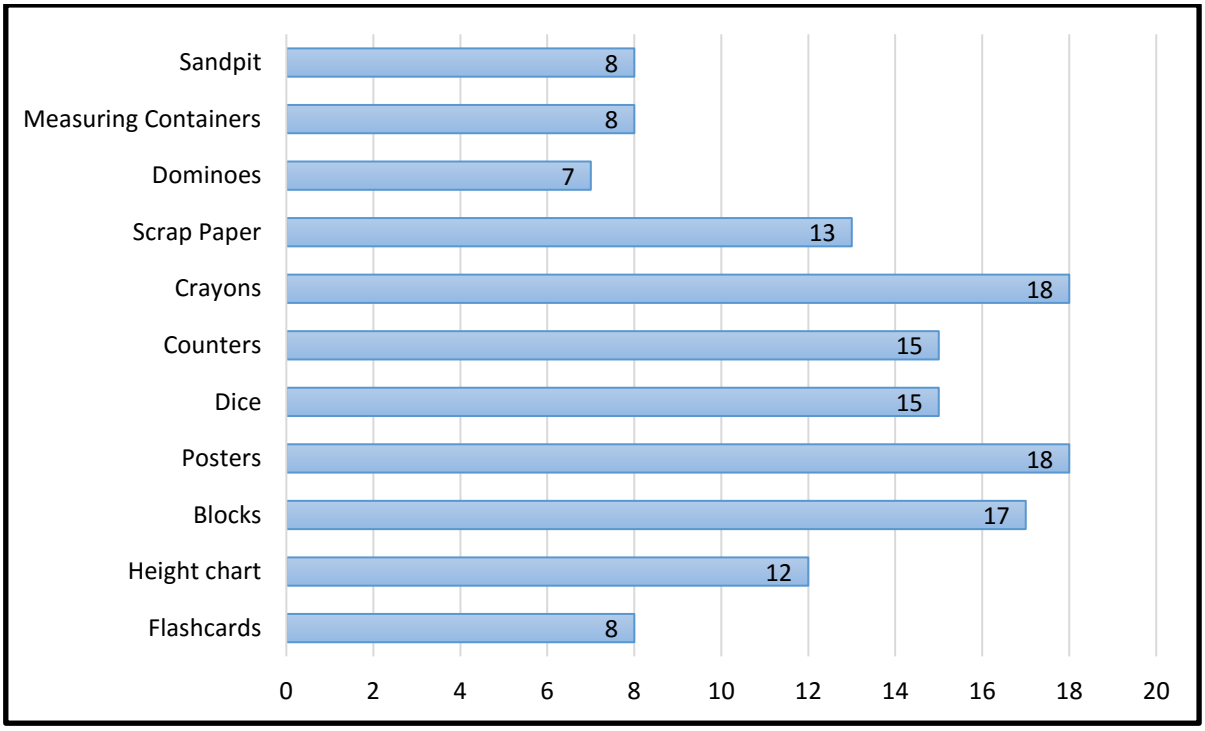

Figure 1: Resources available for Numeracy teaching and learning

Most notable from the above chart is that only seven teachers of the 23 who filled in the questionnaire have dominoes in their classrooms, whereas 15 reported they had counters and dice. It can be surmised from this evidence that the majority of teachers may have access to the 'basic' manipulatives required for numeracy teaching and learning, however few of them have access to additional resources, which are used to support the learning of key mathematical ideas and the development of number sense (such as dominoes) (SANC, 2013).

The following select quotes from the end of year (mid program) questionnaire conducted in October 2016 highlight the significance of resources to participating teachers:

"*We get good resources for teaching our learners in our classroom, and it make our classrooms to be conducive to our learners."*

"We get lots of resources those we wanted very much to have and lots more."

"More resources makes it easier to work. The fact that the learners can be hands on. It has a big change I use ENF material. The way of using the ENF material."

"The resources I have received make fun in my class."

"Continue to involve the learners in practical activities using the various resources and allow them to investigate, explore and develop critical thinking."

"In ENF there are many resources that help us as a teacher."

Teacher-learner ratio

A second consideration when discussing 'quality' grade R education is the school quintile[1] system – from no-fee paying schools to ex-model C schools, the money available for establishing and/or continued support of a 'new' grade differs greatly depending on the school's quintile classification. Admissions policies, for these schools in particular, have a great impact on the teaching and learning. It often results in the better-resourced schools having fewer children (as not everyone can afford the fees); whereas those schools in the poorest neighbourhoods are often obliged to admit as many children who apply (which could reach beyond 40 per class in some schools). The teacher-learner ratio, particularly in Grade R with, its focus on 'learning through play' and the importance of physical activity for holistic development, has a serious impact on a teacher's classroom practice, and therefore on the 'quality' of Grade R education.

Findings

In their paper entitled "Meta-Analysis of Research on Class Size and Achievement", Glass & Smith (1979) looked to a wide range of research studies and literature in order to 'coax out' the findings across the spectrum, in relation to class size and its impact on learning. Their concluding line reads simply: "There is little doubt that, other things equal, more is learned in smaller classes" (p. 15).

It is of no doubt to teachers themselves that class size matters. The School Realities 2009 document released by the Department of Education gives the teacher – learner ratio (in government classes) as 1:32.6 (DoE, 2009). Green, et al., (2011) caution however that "it is likely that the ratio in the foundation phase may be higher than this" (p. 115).

The following table outlines the learner numbers amongst the ENF participating teachers:

Table 1: Number of children per Grade R class

Teacher	Number of Children	Teacher	Number of Children	Teacher	Number of Children
A	13	**H**	26	**O**	35
B	15	**I**	26	**P**	36
C	16	**J**	27	**Q**	38
D	20	**K**	28	**R**	40
E	21	**L**	28	**S**	41
F	24	**M**	30	**T**	42
G	24	**N**	30	**U**	49

[1] "All South African public ordinary schools are categorised into five groups, called quintiles, largely for purposes of the allocation of financial resources. Quintile one is the 'poorest' quintile, while quintile five is the 'least poor'.These poverty

rankings are determined nationally according to the poverty of the community around the school, as well as, certain infrastructural factors. Schools in quintile 1, 2 and 3 have been declared no-fee schools, while schools in quintiles 4 and 5 are fee-paying schools." http://wced.school.za/comms/press/2013/74_14oct.html

From the above table, it can be seen that seven of the participating teachers are teaching in classrooms that have a ratio above that stipulated by government policy (1:32.6), with four of those teachers facing groups of children above 40, as high as 49 in one classroom.

Significant to this paper however, is the support teachers will and already do need in dealing with larger groups of children. Discipline can become a debilitating struggle in large classes (Luiselli, Putnam, Handler, & Feinberg, 2005); and the concerns regarding discipline was expressed through the end of year questionnaire (Oct 2016) wherein one teacher described her difficulties implementing one of the ENF activities:

"The learners were making a chaos and grabs the card to steal"

Taking into consideration the benefits offered within professional learning communities (PLCs), as they appear "to hold considerable promise for capacity building for sustainable improvement" (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006, p. 221), there is potential for discipline challenges to be addressed amongst the participating teachers, as they share solutions and suggestions. The facilitators too are available to consult on these matters.

One of the teachers requested that the program coordinators conduct "*monitoring in our classrooms*" (October 2016), signifying the need for PLC's and CoPs to support teachers both during the training and further into their classrooms.

Experience, qualifications, and opportunities for further learning

A third element which greatly impacts 'quality' is the experience level and qualifications of the teachers. The qualifications of teachers matter. It is not all that matters, but sufficient and extensive training provides an important foundation on which a teacher can rely when in the classroom. Unfortunately, many teachers in South Africa are not adequately trained. A survey conducted in 2004, and reported on by Green, et al. (2011): "suggested that perhaps as few as half of all teachers teaching in the foundation phase had been trained to teach in this area" (p. 111).

They further lament on the skills level of foundation phase teachers:

> Only since 2001, and the concentration of all teacher education provision in the university sector, have good quality foundation phase teachers begun to be trained on a more consistent basis. Unfortunately, this otherwise positive trend is being negatively affected by the declining status of teaching as a profession, and, within that, by the perceived lower attractiveness of primary versus high school teaching qualifications: What exacerbates the implications of these findings that too few new foundation phase teachers are being educated at present, is the broader context that many current foundation phase teachers have not been trained in the area, and that many of those who have been trained have been poorly trained.
>
> (Green, Parker, Deacon, & Hall, 2011, p. 111)

The impact on the learners, as well as the teachers, of insufficient training is a significant one.

Findings

Grade R teachers in particular have encountered various struggles in this regards. One teacher, in an interview conducted on the 26th of July 2016 commented that she had begun studying towards her National Professional Diploma in Education (NPDE) at Nelson Mandela Metropolitan University, but could not complete the course as it has now been discontinued. Another teacher, interviewed on the 24th of May 2016, told of how she started her training on the same course, with funding given by the government, but before she could complete her training, the funding was stopped.

Because Grade R teachers are not wholly recognised as more than practitioners, the majority of them receive a stipend of R5000 a month, with no benefits. This can make paying for extra tuition, not to mention travelling to and from training centres, completely prohibitive. A conversation I had with two teachers later in the year made me aware of another level of complication to the teachers' plight regarding further training: they told me that there was in fact funding available from the government that would help them to further their studies, however, in order to qualify for funding, they were told by the district office that they needed to have permanent posts. But they did not qualify for permanent posts, because they are not fully qualified.

The following chart outlines the qualification levels of the participating ENF teachers:

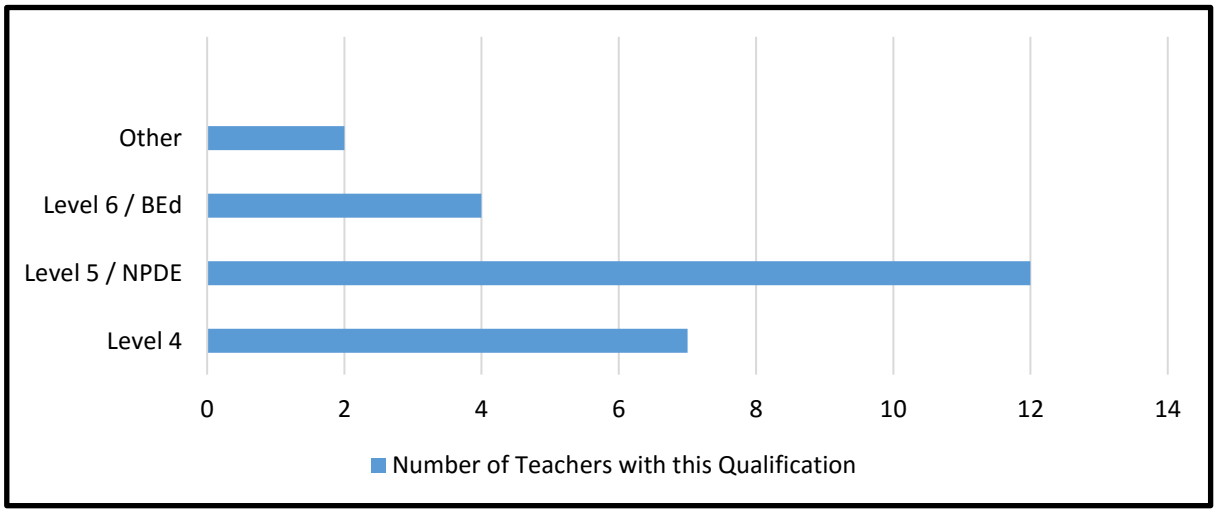

Figure 2: ENF participating teachers' qualification levels

The majority of teachers (12) have a National Qualifications Framework (NQF) Level 5[2] qualification, which is one level lower than a Bachelor's degree, and for these teachers is often in the form of a National Professional Diploma in Education (a three year course).

[2] More information on NQF Levels and Level Descriptors can be found here: http://www.saqa.org.za/list.php?e=NQF

The majority of the teachers interviewed said they would like to continue their studies, with three teachers indicating they would like to continue to Honours Level.

In terms of the argument put forth in this paper, it is evident from this small sample group that the desire to learn and grow professionally is strong – and the teachers are cognisant of wanting to provide 'quality' education to the learners in their care – however formal training opportunities such as those offered by universities and colleges are often financially exclusionary for Grade R teachers in particular.

Professional Development

I do not claim here that this list of challenges to the notion of 'quality' of education is a comprehensive list. Many other factors will impact education, such as parents' levels of literacy, health issues of the children etc., but this paper does not have the scope to discuss all of these. However, the issues I have alluded to here are the most glaringly obvious ones I have so far encountered in my interviews and visits with the project's participating teachers. I also do not argue that these issues are only faced by Grade R teachers, and many of them influence the teaching and learning of all children throughout Grade R to 12. The next challenge I discuss however, I will argue is especially endemic amongst Grade R teachers.

The final influencing factor I will discuss in this paper is in relation to teacher professional development opportunities - the opportunities afforded to Grade R teachers in particular. I speak specifically to the possible implications of providing opportunities to participate in PLC's or CoPs, based on the initial findings from the larger study.

A teacher's training, knowledge of how to teach, as well as understanding the concepts being taught, must be included in any conversation related to 'quality' teaching and learning. Spaull (2013) warns that: "teachers who lack an elementary understanding of the subjects they teach can actually do harm to their pupils" (p. 29). In light of this, the importance of participation in professional learning communities must be considered: the benefits of which have been widely researched, both locally and internationally (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006; Graven M. , 2002).

This method of training and development, with its *modus operandi* involving workshop-like sessions, a narrowed focus, and the offering of practical solutions with immediate implementation opportunities, can also be viewed as a more cost-effective and manageable method of knowledge exchange.

Findings

The participating teachers were asked if they had had the opportunity to participate in any such programs in the two years before their joining the ENF program. Thirteen of the teachers listed a total of 23 workshops attended (some teachers attended more than one). Of the 23 workshops attended, 10 were Grade R specific. The other workshops were focussed on: "Grades R-3; Grades R-6; Grade 3; Grade 3 & 4; and All Grades". 10 of the

teachers who completed the questionnaire had attended no professional development training at all in the previous years.

This indicates that there is a need for professional development opportunities for these teachers, and that the opportunities offered to them so far have not been Grade R specific. It is crucial to highlight here that although Grade R is considered a part of the Foundation Phase, the teaching and learning occurring within the classrooms is founded on different pedagogies and philosophies; with its focus on active learning and learning through play. This is echoed in the CAPS document as it states "Grade R should not be a watered down Grade 1" (DBE, 2012, pp. 16-17).

The need for Grade R specific training was re-iterated by the participating teachers when asked to reflect on the ENF training for the year 2016. Two comments were made about one session in particular, in which we invited an internationally renowned speaker to address the group. Her expertise however was in working with older children. This is how the teachers felt about it:

"I didn't understand lots of games there and as a practitioner struggle with them"

"The session with [speaker], maybe because it was more on a level for grade 3 & 4's. But I was really happy that the (ENF) ladies were able to change her ideas to make it suitable for grade R learners, within our number range"

Although still too early in the study to make definite claims about the effects of participation in a Grade R focused professional learning community such as the ENF program, I offer here some of the teachers' comments in response to a question about changes the participants had noticed in themselves as teachers:

Yes, I am much more patient as I used to be

I became to use all the resources on a daily basis. I started to make maths my own

I have using a new strategy of teaching since I attending this workshop

I am looking every day and confident to teach my children Math and that I can use different resources and strategies I that I am confident to teach maths than before

Yes because now I do my maths lovely and proudly for the sake of you

Yes. I'm very confident teaching

Love Maths! Favourite subject and increased confidence

I know how to deal with a learner struggling in mathematics. How to change strategies

Have done a lot more maths activities every day

I loved maths and the teaching thereof even before I started, but I think I feel more encouraged after I joined

Now I enjoyed teaching with number

Yes I know how to deal with children struggling in Mathematics

It is evident from the above selection that there are definite advantages to participation, both in terms of the quality of teaching and learning in the classrooms, but also in terms of the teachers' own professional growth and recognition as professionals.

CONCLUDING REMARKS

This paper has highlighted some of the challenges currently faced by Grade R teachers, both within the study, and throughout South Africa. Although these challenges are not uniquely relevant to Grade R teachers, the challenges regarding opportunities for participation in professional learning communities or communities of practice have hit these teachers the hardest. It is outside of the scope of influence of PLCs and CoPs to address educational issues around class-size and infrastructure, however, the support offered within learning communities, and through access to 'experts' through 'legitimate peripheral participation' (Wenger E. , 1998), it is possible that Grade R teachers will be able to learn to cope with these challenges in new ways.

I argue here, based on the initial findings and preliminary analyses of the larger study, that there is a strong desire by these teachers to improve themselves, and improve their teaching. However, this desire is not being matched by the opportunities currently afforded them – this is important as, I believe, Grade R Teacher Numeracy Communities have significant potential to provide spaces for teacher growth, learning and development. Therefore, it is recommended that Grade R teachers in particular are given more opportunities to grow professionally through the medium of PLCs and CoPs, which offer targeted Grade R training. It is also recommended here that the content of these professional learning programs take into consideration, and keep as the focus, the unique pedagogical requirements of Grade R. Through increasing access to these opportunities, it is envisioned that the 'quality' of teaching and learning in Grade R could well improve significantly.

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References

Adler, J. (2000). Conceptualising resources as a theme for teacher education. *Journal of Mathematics Teacher Education, 3*(3), 205-224.

Atweh, B., Bose, A., Graven, M., Subramanian, J., & Venkat, H. (2014). *Teaching numeracy in pre-school and early grades in low-income countries.* Unpublished.

Barnard, E., & Braund, M. (2016). Strategies for the implementation of mathematics in grade R: Teachers' beliefs and practices. *South African Journal of Childhood Education, 6*(1), 1-8. Retrieved from http://dx.doi.org/10.4102/sajce

Bloch, G. (2009). *The toxic mix: What's wrong with South Africa's schools and how to fix it.* Cape Town: Tafelberg.

Buysse, V., Winton, P., & Rous, B. (2009). Reaching Consensus on a defintion of professional development for the early childhood field. *Topics in Early Childhood Special Education, 28*(4), 235-243.

Equal Education. (2016, November 30). *EC school visits report launch*. Retrieved February 2017, from Equal Education: https://equaleducation.org.za/2016/12/01/ec-school-visits-report-launch/

Excell, L., & Linington, V. (2011). Taking the debate into action: does the current grade R practice in South Africa meet quality requirements? *SA-eDUC Journal, 8*(2), 3-12.

Fleisch, B. (2008). *Primary education in crisis: Why South African schoolchildren underachieve in reading and mathematics.* Johannesdburg: Juta.

Graven, M. (2002). *Mathematics teacher learning, communities of practice and the centrality of confidence.* Johannesburg: University of the Witwatersrand.

Graven, M. (2004). Investigating mathematics teacher learning within an in-service community of practice: The centrality of confidence. *Educational Studies in Mathematics, 57*(2), 177-211.

Graven, M. (2013). Poverty, inequality and mathematics performance: The case in South Africa's post-apartheid context. *ZDM Mathematics Education*, 1-11.

Graven, M., & Lerman, S. (1998). Wenger, E.(1998). Communities of practice: Learning, meaning and identity. *Journal of Mathematics Teacher Education, 6*(2), 185-194.

Graven, M., & Venkat, H. (2017). *Changing teaching through a resources approach. In improving primary mathematics education, teaching and learning: Research for development in resource-constrained contexts (*pp. 163-178). Palgrave Macmillan.

Green, W., Parker, D., Deacon, R., & Hall, G. (2011). Foundation Phase teacher provision by public higher education institutions in South Africa. *South African Journal of Childhood Education, 1*(1), 109-121.

Hoadley, C. (2012). 12 What is a community of practice and how can we support it? *Theoretical foundations of learning environments*, 286.

Hoadley, U. (2007). The reproduction of social class inequalities through mathematics pedagogies in South African primary schools. *Journal of Curriculum Studies, 39*(6), 679-706.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press.

Little, J. (2002). Locating learning in teachers' communities of practice: Opening up problems of analysis of records of everyday work. *Teaching and Teacher Education, 18*(8), 917-946.

Long, R. (2015). *An investigation into the promotion of productive learning dispositions in government policies and teacher assessment in grade R and grade 1.*Unpublished master's thesis, Rhodes University, Grahamstown.

Luiselli, J. K., Putnam, R. F., Handler, M., & Feinberg, A. B. (2005). Whole-school positive behaviour support: effects on student discipline problems and academic performance. *Educational Psychology, 25*(2-3), 183-198.

Onyango, W. P. (2014). Effects of teaching and learning resources on pre school learners transition to class one: A case study of Rachuonyo south sub county. *Journal of Education and Practice, 5*(34), 154-160.

Pausigere, P., & Graven, M. (2014). Learning metaphors and learning stories (stelos) of teachers participating in an in-service numeracy community of practice. *Education as Change, 18*(1), 33-46.

Post, T. (1981). The role of manipulative materials in the learning of mathematical concepts. *Selected Issues in Mathematics Education*, 109-131.

Richardson, V. (1998). How teachers change: What will lead to change that most benefits student learning. *Focus on Basics, 2*(4), 7-11.

SANC. (2013). *South African Numeracy Chair*. Retrieved 2014 йил 23-September from www.ru.ac.za: http://www.ru.ac.za/sanc/nicle/

South Africa. Department of Basic Education. (2011). *Action Plan to 2014: Towards the realisation of schooling 2025.* Retrieved 2014 йил 24-September from Department of Basic Education: www.education.gov.za/Curriculum/ActionPlanto2014/tabid/418/Default.aspx

South Africa. Department of Basic Education. (2012). *Curriculum Assessment Policy Statements*. Retrieved 2012 йил 5-October from Department of Basic Education South Africa: http://www.education.gov.za/Curriculum/CurriculumAssessmentPolicyStatements/tabid/419/Default.aspx

South Africa. Department of Education. (2009). *School Realities 2009.* Department of Education. Retrieved from http://www.education.gov.za/

Spaull, N. (2013). Poverty & privilege: Primary school inequality in South Africa. *International Journal of Educational Development, 33*, 436-447.

Spaull, N. (2013). *South Africa's education crisis: The quality of education in South Africa 1994-2011.* Johannesburg: Centre for Development and Enterprise.

Spaull, N., & Kotze, J. (2015). Starting behind and staying behind in South Africa: The case of insurmountable learning deficits in mathematics. *International Journal of Educational Development, 41*, 13-24.

Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). Professional learning communities: A review of the literature. *Journal of Educational Change*, *7*, 221-258.

Wenger, E. (1998). *Communities of Practice: Learning, meaning and identity*. New York: Cambridge University Press.

Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. New York: Cambridge University Press.