

'They are visually impaired, not blind ... teach them!': Grade R in-service teachers' knowledge of teaching pre-reading skills to visually impaired learners

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Background: Teaching reading skills is the cornerstone of all learning; therefore, teachers' adherence to this mandate is important. However, it becomes complicated and challenging if the teacher has to teach pre-reading skills to Grade R learners with visual impairments. In light of this challenge, researchers have endeavoured to determine the Technological Pedagogical and Content Knowledge (TPACK) that teachers should possess for the effective teaching of reading in classrooms with visually impaired learners.

Aim: This article explores a small sample of in-service teachers' knowledge of using Braille to teach pre-reading skills to Grade R learners with visual impairments.

Setting: The study was conducted in a School for the Blind in Maseru, Lesotho, where three Grade R in-service teachers teaching learners with visual impairments were purposively sampled.

Methods: This study is underpinned by Koehler and Mishra's theory of TPACK. An interpretivist, qualitative small-scale case study approach was employed, using semi-structured interviews and classroom observations. Document analysis was also used to corroborate findings.

Results: Findings reveal that although some of the participants possess a high level of technological knowledge, they tend to teach Braille as a 'stand-alone' skill and fail to integrate it with the teaching of other pre-reading skills to Grade R learners.

Conclusion: In-service teachers showed limited knowledge of some of the essential skills for teaching pre-reading skills to Grade R learners who are visually impaired. The study calls for supportive in-service teacher education programmes that equip Grade R teachers of learners with visual impairments with the necessary skills to teach pre-reading skills.

Keywords: Braille; Grade R Learners; Pedagogical Knowledge; Pre-Reading Skills; Technological Knowledge; Visual Impairment.

Introduction

This article focusses on Grade R in-service teachers' knowledge of using Braille to teach pre-reading skills to visually impaired Grade R learners.

The curriculum policy of the Lesotho Ministry of Education and Training (MoET) is a joint venture involving the government, churches and the community. The Lesotho MoET introduced Grade R as a class that was attached to primary education in 2007. Consequently, the new curriculum policy was developed in 2008. The policy states that primary school in-service teachers should know basic literacy concepts, that is, they should possess content and Pedagogical Knowledge (PK) of teaching listening, speaking, reading and writing skills (Ministry of Education and Training 2008). Such statements are in accordance with the fact that reading skills are a crucial component of literacy (Hugo 2010). They should be taught in an educationally rich, favourable and learning-friendly learning space that comprises various learning corners (a reading corner, library corner or fantasy corner). This enables learners to interact with reading experiences at their own appropriate and convenient times, and where they can use clay or plasticine to form letters. According to Maurer (2007), learners who are visually impaired should be exposed to tactile symbols and tactile books as part of their preparation with regard to pre-reading skills.

Maphumulo (2010:20) states that reading is 'the making of meaning from print, with an emphasis on phonemic awareness, phonics, fluency and comprehension'. In concurrence with Maphumulo

(2010), Bester, Meyer and Evans (2013:102) cite Read (2005) to affirm that 'reading is a process in which information from the text and the reader's background knowledge act together to produce meaning'. Bearing this in mind, the development of early reading skills is crucial to learners either when reading for pleasure or for knowledge development (Machado & Botnarescue 2011). The curriculum policy of the MoET further emphasises the significance of inclusive education (2008). In particular, it states that Teachers of Visually Impaired Learners (TVIs) should be knowledgeable about Braille codes that need to be taught to learners with visual impairments to enable them to read. In principle, they should be knowledgeable of how to teach reading skills to learners with visual impairments using teaching approaches, methods and resources that are in sync with the learners' age, phase and level of visual impairments.

Grade R learners with visual impairments are not exempted from developing their emergent literacy and pre-reading skills. On the contrary, the ability to read gives them an opportunity to become independent and develop their self-esteem on an ongoing basis. It is, thus, imperative for Grade R learners with visual impairments to learn to read using different available devices like Braille to attain independence and a sense of belonging in their respective societies.

Braille was invented by the Frenchman Louis Braille in the 19th century, and it was the first writing which bears his name (American Foundation for the Blind 2015). Louis Braille modified the 12-dot alphabet that had been created by Charles Barbier as a language by touch designed for military and secret purposes. Barbier's code was known as *Ecriture Nocturne*, or 'night writing'. Louis Braille modified these codes into six raised dot cells that form letters of the alphabet, whole words, punctuation marks and even numbers. Kimbrough (2005) affirms that it took decades for Braille to be established as the tactile system of reading and writing for people who are blind or who have low vision and who cannot benefit from ordinary printed materials. It was only in 1852, after Louis Braille's death, that countries recognised and officially declared Braille code a means of communication for people who are blind or have low vision (Kimbrough 2005). Many countries that were colonies of the British Empire used Standard English Braille (SEB), whereas the United States used different codes before it adopted English Braille American Edition. Because of numerous challenges, fluctuating environments and many rules and regulations of SEB, there was a paradigm shift from SEB to Unified English Braille (UEB).

The International Council on English Braille (ICEB) was launched in 1991. The ICEB was formed by nine member states, with the Republic of South Africa being one of them. This body mainly focussed on standards-setting for Braille in the English language, resulting in the development of UEB. Unified English Braille is a Braille code developed to combine several existing Braille codes, namely, a literary code, a science code, a mathematics code and a computer code, into one common code so that it can be used by all

English-speaking countries throughout the world (Clear-Vision Children's Braille Library 2013). Unified English Braille enables computers to convert print into Braille and Braille into print, and is built into most Braille translation software programs, screen readers and note-takers to make it accessible and to reduce the costs of buying different software. It is also used to lessen the volume of paper required for reproducing books in Braille and to ease the reading process. According to Clear-Vision Children's Braille Library (2013):

Unified English Braille (UEB) took over twenty years to develop. It has now been adopted in all the major English speaking countries worldwide, including Australia, Canada, New Zealand, Nigeria, South Africa, the UK and the USA. (p. 2)

Consequently, it is expected that the main code for reading and writing material will be UEB throughout the English-speaking world by 2016.

There is very limited research-based knowledge in the African context regarding the teaching of reading skills to Grade R learners who are visually impaired. The purpose of this article is to explore some Grade R in-service teachers' understandings of using Braille to teach pre-reading skills to Grade R learners with visual impairments. Before moving to the study itself, we first unpack some of the concepts that underpin Grade R in-service teachers' knowledge, particularly in terms of using Braille to teach reading.

Unpacking the study's key concepts

Braille

The American Foundation for the Blind (2015) states that Braille is:

[A] system of raised dots that can be read with the fingers through touch by people who are blind or who have low vision and with eyes by people who are sighted. (p. 2)

Elaborating on the definition of Braille, the Royal National Institute for the Blind (1992:1) clarifies that 'Braille is a system of embossed signs which are formed by using combinations of six dots, arranged and numbered'. It is composed of cells of dots that nicely match with the fingertips as information receptors. Figure 1 shows an example of a Braille cell and the way in which the dots are numbered.

Massof (2009) explains the Braille cell as follows:

[B]raille six dots arranged in two columns each containing three dots and that is called a Braille cell. On the first column the dots are numbered one to three beginning at the top and four to six beginning at the top of the second column. Letters are formed by

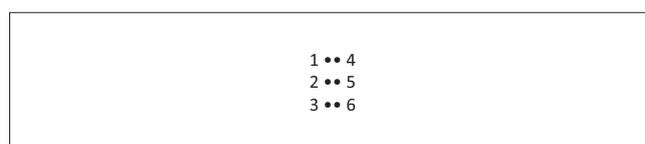


FIGURE 1: Braille cell with numbered dots.

raising some dots that will represent the letters of the alphabet, for instance letter *a* is encoded by raising only dot 1, *b* is encoded by raising dot 1 and 2, a space is represented by an empty cell with no dots raised. (p. 1530)

In essence, Braille is not a language; rather, it is a code in which many other languages like English, Chinese, Spanish and African languages can be written (Howse 2006), so that visually impaired people can access them via tactile decoding. It fundamentally provides a means of literacy and communication to all people who are blind or have low vision.

Visual impairment

Visual impairment is an umbrella term for total blindness and low vision. It is a condition that, even with correction, adversely affects a child's educational performance (Burton et al. 2008). Visual impairment is divided into two categories, namely, (1) blindness and (2) low vision. In the context of this study, visual impairment refers to learners who are totally blind and are using Braille as their means of written or reading communication. Blindness and low vision can be defined as:

1. *Blindness*: '[...] visual acuity worse than 20/400 with the best possible correction, or a visual field of 10 degrees or less' (Mandal 2013:1). The author explains that blindness is having either no vision or, at the most, light perception (i.e. the ability to tell light from darkness), but no light projection (i.e. the ability to identify the direction from which the light comes).
2. *Low vision*: '[...] means vision between 20/70 and 20/400 with the best possible correction, or a visual field of 20 degrees or less' (Slavin 2009:28). The author further explains that low vision is a condition in which clarity of sight is reduced permanently to such a level that an individual is incapable of performing tiny daily living visual tasks (Slavin 2009).

Grade R

Grade R is the first grade offered in primary schools as part of formal learning. This is the reception grade, where learners are usually five-year-olds or will turn five years old by the end of June in that calendar year and are received in formal schooling (Department of Basic Education 2011). In Lesotho's context, Grade R is referred to as preschool. This stage falls under the Integrated Early Childhood Care and Development (IECCD) (MoET 2008). Similarly, in Lesotho, learners have to be five years old to qualify for the commencement of formal school readiness. However, Grade R learners with visual impairments are admitted to schools for the blind at the age of seven or eight years or above because of their special education needs.

The importance of learning to read using Braille in the lives of Grade R learners with visual impairments

Massof (2009) emphasises the vital importance of learning how to use Braille by learners with visual impairments.

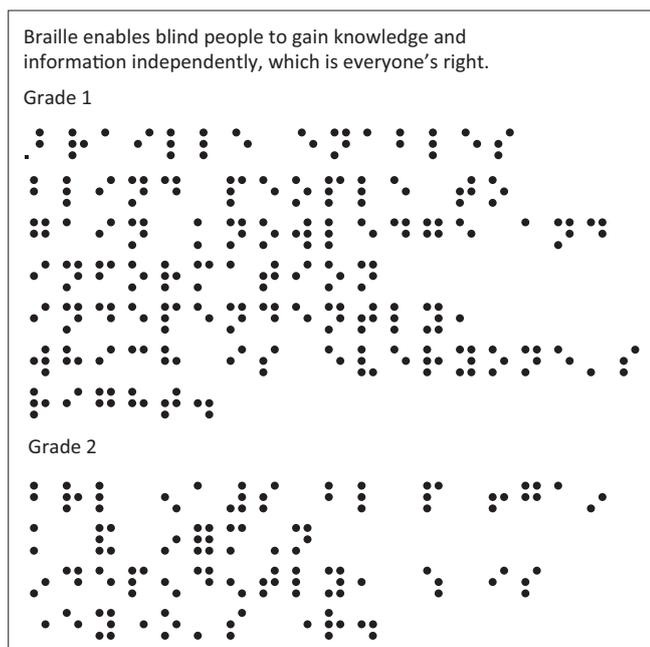
The author states that Braille opens the doors to education, employment opportunities and enables learners who are visually impaired to interact with language independently in their own appropriate time and space.

Tom (2010) further notes that Braille defines literacy for the visually impaired, and it has been accepted globally as the means of written communication for people who are blind. So anyone who can read and write Braille is deemed literate, whereas a visually impaired person who cannot read and write Braille is considered illiterate by the community of people who are sighted, even if a person can use assistive devices properly. He further states that Braille gives blind learners a sense of privacy, confidentiality and independence because they will be able to label their own belongings and read and write on their own without outside help. Moreover, Braille upholds the rights of the blind. Being able to read and write in Braille supports the right of the visually impaired to information; for example, they will have knowledge about current affairs because they can access printed texts that have been converted into Braille code. A learner who is visually impaired has to learn to read and write Braille manually before learning to use assistive technology or devices such as the Mountbatten Brailier. Braille is not only an effective means of communication, but it is a proven avenue for achieving and enhancing literacy for learners who are blind or have significantly low vision (Pierce 1996). As a result, various countries have advocated the inclusion of all learners in their respective school settings, regardless of their disabilities (Russell & Airasian 2012). In this regard, Department of Education (2001) South Africa's Education White Paper 6 indicates that all schools should accommodate and acknowledge all learners from diverse cultural backgrounds, including those with different disabilities and abilities.

Swenson (2005) elaborates that Braille has two ways of writing, namely, Grade 1 Braille (alphabetic or uncontracted Braille) and Grade 2 Braille (contracted Braille). In Grade 1 Braille, every letter of each word is expressed like in print and is mostly used by beginners, whereas in Grade 2 Braille cells are used individually or in combination with others to form a variety of contractions or whole words. For example, the word 'like' is represented by letter *l* in Grade 2 Braille.

Figure 2 is an illustration of the sentence 'Braille enables blind people to gain knowledge and information independently, which is everyone's right', as per Seymour-Ford (2002) illustration of Braille writings. It is written in both Grade 1 and Grade 2 Braille, respectively. In Grade 1 Braille, every letter is written as in print and this occupies many Braille cells, whereas in Grade 2 Braille there are abbreviations such as *bl* for *blind* and *brl* for *Braille*; word-signs such as *K* which represents the word *knowledge* and *P* for *people*; and group-signs such as *ever* in *every*, and *en* and *ble* for *enables* (Royal National Institute for the Blind 1992).

Kamei-Hannan and Sacks (2012) state that Braille learners learn to read and write using a tactile code instead of printed characters. Therefore, teachers have to be knowledgeable and



Source: Seymour-Ford, J., 2002, *History of the Perkins Braille*, pp. 32–70, Perkins School for the Blind, Bath

FIGURE 2: Uncontracted Grade 1 and contracted Grade 2 Braille codes.

creative to develop activities that will allow Grade R learners to manipulate and use their fingers more often to sharpen their finger sensitivity.

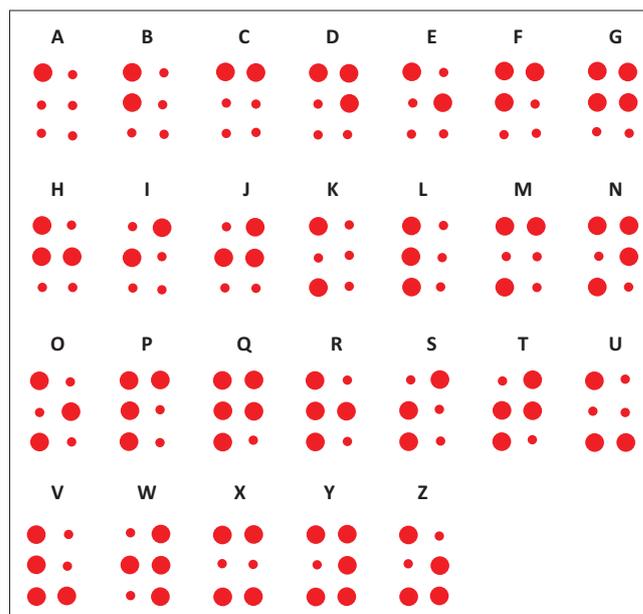
Figure 3 illustrates Braille letters of the alphabet where the thick, big dots show the raised dots for each letter of the alphabet.

Grade R teachers' roles and responsibilities of teaching pre-reading skills to learners who are visually impaired

As pointed out by Shapiro, Carroll and Solty (2013), teaching pre-reading skills to Grade R learners with visual impairments is slightly different from those of mainstream learners. In such contexts, pre-reading skills significantly involve activities that prepare learners for reading. As a result, it is important to understand that conversational skills form the basis of pre-reading skills development (Maurer 2007).

Paratore and McCormack (2007) state that TVIs play an important role, as such learners are regarded as learners with special educational needs. The authors suggest that one of the most important roles is to teach them to read and write Braille, as it is their means of becoming literate.

Teachers of visually impaired learners teach various skills such as daily living activities and the use of adapted materials and activities. Secondly, TVIs are responsible for managing and coordinating the services that the learners with visual impairments receive (Friend & Bursuck 2012). Wamba and Dunn (2009) argue that the services should include writing and implementing an Individualised Educational Plan (IEP). The authors further explain that IEPs are route maps on how



Source: Massof, W.R., 2009, 'The role of Braille in the literacy of blind and visually impaired children', *Archives of Ophthalmology* 127(11), 1530–1531. <https://doi.org/10.1001/archophthalmol.2009.295>

FIGURE 3: Braille letters of the alphabet.

the teaching and learning of a learner with a disability should take place. Such a plan includes modifications and adaptations of the activities and the curriculum. Another important factor is that TVIs have to work collaboratively with a multi-disciplinary team that comprises the school principal, school psychologist, counsellor, speech or language therapist, Brailleist, Orientation and Mobility instructor and social worker. Moreover, TVIs are responsible for adapting and modifying the activities performed in the classroom to fit the needs of Grade R learners who are visually impaired. Tom (2010) and Lohmeier, Blankenship and Hatlen (2009) highlight that being visually impaired does not mean that a learner is incapable of doing daily and simple activities in the classroom. In South Africa, it is notable that learners with visual impairments have to be involved in all reading activities taking place in any Grade R classroom as per national curriculum policy, also known as CAPS (DBE 2011). This policy is similar to Lesotho MoET curriculum policy (2008:4), which highlights the importance of 'the life challenges and contexts in which the learner is expected to function'. However, full description, adaptation and modification of lessons should be provided to ease the learning and development of reading skills to such learners (Hardle 2007). According to the *Handbook on Teaching Reading in the Early Years* (DoE 2008), reading activities involve reading aloud, exposure to environmental print, group-guided reading, shared reading and independent reading. However, Massof (2009:1534) cautions that it is imperative that teachers of learners with visual impairments 'focus on the learner's ability rather than on his/her disability' while adapting and modifying the learning context.

Reception year pre-reading skills-related activities and concepts

The Progress in International Reading Literacy Study (PIRLS) 2016 report indicates that South Africa was found to be the

lowest performing country out of 50 countries in the PIRLS 2016 study conducted worldwide (Howie et al. 2017). However, in its assessment, PIRLS focusses on able learners and excludes learners with learning disabilities. The PIRLS 2016 study could, thus, be perceived to be lacking inclusivity. There are, thus, no reliable assessments of visually impaired learners. Notably, the PIRLS questionnaires provide rich data relating to factors associated with reading achievement such as the school environment, home environment and classroom contextual factors (Howie et al. 2017). Because learning impaired children were excluded from the PIRLS assessments, this rich contextual information is not available in the case of visually impaired learners.

Hugo (2010) argues that every Grade R classroom needs to have a conducive and reading-ready context created to ensure that learners find reading interesting. However, the situation seems to differ when teaching of reading has to occur in a reception year classroom with learners with visual impairments. Maurer (2007) points out that most of the activities in the reception class need vision to be done effectively. For example, identifying colours requires vision. The author further explains that some activities do not need vision, such as naming letters of the alphabet; singing rhyming words; recognising letters; naming objects, people, places and geometric shapes; and describing oneself. However, learners who are totally blind do not have a clue of things such as colours because they need vision, but they can learn to visualise colours with common objects or events such as 'the sky is blue'. Therefore, learners who are visually impaired learn various colours just by listening to their sighted counterparts.

The ability to read has attracted the attention of various researchers globally, who have conducted studies on how it should be developed in diverse teaching and learning environments. Reading ability is regarded as the cornerstone of all learning; however, learning to read is complex and there is not yet consensus of a single cutting-edge approach as to how reading develops (Hugo 2010). In essence, it is important to understand that literacy skills and competencies need to be developed in the early years by means of active and meaningful activities and in an environment that is conducive for learning. In light of this, Emerson, Holbrook and D'Andrea (2009) indicate that Grade R learners who are visually impaired not only need to learn the grammatical rules and spelling of their language, but they have to overlay that knowledge with Braille codes and their rules. They also need to develop tactile skills so that they will be able to identify, classify and eventually read Braille dots and make meaning from touch (Massof 2009). Cooper and Nichols (2007) point out that the omission of a single Braille dot alters the whole meaning of the word. A similar situation is, of course, also experienced by young sighted learners where failure to accurately read sequences of letters can change the meaning of the word, for example, *three* versus *tree*. However, in Braille, the omission of dots can cause additional confusion of word meaning as learners are exclusively dependent on their tactile skills. Needless to say, all Grade R learners with visual

impairments have to learn these tactile literacy skills to develop their emergent reading skills (Palmer & Bayley 2010).

Theoretical framework

This study is underpinned by Kohler and Mishra's theory of Technological, Pedagogical and Content Knowledge (TPACK) of 2009. Because of the nature of the study where the use of Braille and Braille tools was seen as effective strategies for imparting literacy to learners with visual impairments, TPACK was regarded as a suitable theory to frame my study. Koehler and Mishra's theory is built on Lee Shulman's construct of Pedagogical Content Knowledge (PCK).

Koehler and Mishra (2009) articulate that there are three main components of teachers' knowledge of technology integration in their theory of TPACK. These components are content, pedagogy and technology. Content knowledge is knowledge of the subject matter that has to be taught or learnt in a particular grade (Mishra & Koehler 2006; Shulman 1986). In this article, it was expected that the in-service teachers would have knowledge of important concepts, skills and facts of literacy as a fundamental subject in the foundation phase, particularly emergent literacy skills.

The second component of TPACK is PK. Pedagogical knowledge is a teacher's knowledge of teaching and learning methods, practices and processes that are used to construct knowledge (Ball, Thames & Phelps 2008; Mzimela 2012; Shulman 1986). In-service teachers need to be knowledgeable of the diverse learning styles of the learners in their classrooms, and they need to be able to design teaching strategies that will enhance their teaching. Knowing that learners are from diverse cultural and linguistic backgrounds will enable in-service teachers to employ various teaching strategies. Such strategies should be included in their planning (Koehler & Mishra 2009). Moreover, knowing learners' diverse learning styles enables teachers to plan differentiated lessons (i.e. instruction) that should consider individual learners' readiness, interests and profile.

The third component of this theory is the knowledge of technology. Technology knowledge is knowledge about 'standard technologies such as books, chalk and blackboard, and more advanced technologies such as the Internet and digital video' (Koehler & Mishra 2009:1027). Grade R in-service teachers have to be knowledgeable of the standard Braille technologies for learners who are visually impaired, such as the Braille stylus, slate, the Perkins Brailler and advanced technologies such as the Mountbatten Brailler, the Perkins Smart Brailler and other Braille note-taking devices. They should also overlay their knowledge of technology with knowledge of how to operate those technologies while teaching reading to visually impaired Grade R learners.

Koehler and Mishra (2009) further define TPACK as:

[T]he basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in

constructive ways to teach content; knowledge of what makes concepts easy or difficult to learn and how that technology can help redress some of the problems that learners face; and knowledge of learners' prior knowledge. (p. 66)

To use technology to support meaningful learning, teachers need additional knowledge of the content they are required to teach, the pedagogical methods that facilitate learners' learning and the specific ways in which technology can support those methods (Ertmer & Ottenbreit-Leftwich 2010:37). Teaching using technology requires teachers to expand their knowledge of pedagogical practices across multiple aspects such as planning, implementation and assessment processes.

Methodology

A case study methodological approach framed within the interpretivists' lens was used to conduct this empirical study. The ontology of interpretive researchers' belief is that there are sets of realities or truths about the world (Creswell 2013), which can best be interpreted by the occupants of that context. Therefore, a single school situated in Maseru, Lesotho, where three in-service teachers taught literacy to visually impaired Grade R learners, was purposively sampled for the purposes of eliciting credible data. More detailed biographical information of the research site sampled is given below.

The schooling context

To protect the school's identity, Bartimia Primary School as a pseudonym is used throughout the study. The school is administered by the Lesotho Ministry of Education and is regarded as a special school. It accommodates learners who are visually impaired from diverse cultural and linguistic backgrounds. All learners speak Sesotho as their mother tongue; however, they come from different areas with different dialects. The school also has a boarding facility to accommodate learners who are not from the immediate vicinity. Boarding learners who are visually impaired are generally from the four different geographical regions of the country. Bartimia Primary School is situated in the Cathedral area in Maseru. At the time of the study, there were approximately 80 boys and girls in the boarding facility from Grade R to Grade 7 and 65 learners who were non-boarders. Some of these learners had other disabilities besides visual impairments and so they were categorised as having multiple disabilities. Bartimia Primary School accommodates learners who have been visually impaired since birth as well as those who became visually impaired while they were attending mainstream schools.

The teachers' biographical information

For the purpose of anonymity, pseudonyms were used for the three Grade R in-service teachers who participated in this study.

Teacher Lefiso was in her early 30s and she had been teaching at Bartimia Primary School since 2008. She had received training in writing and reading Braille at Optima College

in the Republic of South Africa. She had no teaching qualification. Each academic year, new Braille beginners would be assigned to her. She regarded these children as Grade R learners because they were new to the school environment. Their ages would range between 7 and 8 years, with some even slightly older.

Teacher Tlhoholofatso was in her late 50s. She had been teaching at Bartimia Primary School for over 30 years, since 1986. She held a primary teaching qualification. In 1990, she was trained in Braille and Orientation and Mobility at Montfort College in Malawi. Although she had been teaching all the subjects in the primary education phase at Bartimia Primary School since 1986, the year in which the study was conducted was her first year of teaching Grade R learners.

Teacher Moleboheng was in her early 40s. She had primary teacher education and special education qualifications, and she specialised in visual impairment. She had previously taught at a government primary school at intermediate level until 2006. At the time of this study, she had had 4 years of Grade R teaching experience at Bartimia Primary School.

Data collection

Data were collected using multi-data generation tools that included semi-structured interviews, structured classroom observations and document analysis. A 2-month data generation process was undertaken during which all three participants were willing to share their teaching experiences. We engaged in direct face-to-face conversations with the three Grade R in-service teachers to understand how they interpret their real-life situation in using Braille to impart literacy to visually impaired Grade R learners. We also observed how they interacted with their visually impaired learners while using Braille to impart literacy. Cohen, Manion and Morrison (2011) advise researchers to use observation as a data generation method that assists in eliciting data in natural settings.

Generated data were organised according to themes using thematic data analysis. According to Petty, Thomson and Stew (2012), the application of thematic data analysis allows for the presentation of accurate data that are regulated by the study's research questions. The study's key research question concerned the knowledge that Grade R in-service teachers have for imparting literacy to Grade R visually impaired learners.

Ethical considerations

Application to conduct the research was submitted to the relevant bodies. The principal and the participants consented to partake in the study. A separate consent letter was sent to the parents as the teachers were to be observed in their classrooms teaching their learners. We assured anonymity through the use of pseudonyms for the research site and participants. Partaking in the study was voluntary and withdrawal from the study was permitted. Ethical clearance was obtained from the

university's Research and Higher Degrees Office. The Ministry of Education in Lesotho also issues a gatekeeper's letter to conduct research in one of its schools.

Findings

The findings from our engagement with the participants and the classroom observations are presented below. We first describe the classrooms and their resources and thereafter report on the teachers' responses during the interviews and observations of their classroom literacy practices.

Resources in the visually impaired classrooms

Notably, across the Grade R classrooms that were observed, the availability of relevant teaching and learning resources was minimal, to say the least. The classrooms had no learning centres to allow learners' additional contact with literacy concepts during preschool routines such as an area for fantasy play, reading, writing and circle time. Learners seemed to interact with literacy concepts such as writing and letters of alphabet only when they were ordered to do so by their teachers during teaching and learning periods. Generally, classrooms lacked responsiveness to learners' cultural and literacy needs. It was apparent that learners interacted with literacy concepts such as letters of the alphabet and writing skills during classroom lessons, but there were no facilities for fantasy play, exploration or manipulation of objects. Clearly, the learners were not given opportunities to scribble, doodle or practise cutting and copying in their own time because there were no such learning centres and literacy materials to use. There were no real and/or improvised toys to play with so that they could become familiar with the names of various objects, which implied that time for fantasy play was limited, or even non-existent. It was also noticed that teachers know how to teach pre-reading skills using pegs, slates with pins, and slates and styluses. Although these tools are now regarded as old-fashioned ways of writing Braille, given the lack of resources, they were at least better than nothing. It was clear that teachers could not introduce learners to advanced Braille tools such as Perkins Braille machine, the Mountbatten Braille and computers with speech devices because of the scarcity and cost of such tools.

Overall, the observed classrooms were deemed not literacy-friendly and modern Braille technology was not available. It was clear that the teachers were not familiar with Cushman's (2013) view of an ideal classroom for learners with visual impairments, where objects in a classroom need to have textual and textural labels to ease movement and location for learners.

Grade R teachers' pedagogical content knowledge of teaching reading skills using Braille

Oral communication

Oral communication, involving speaking and listening skills, forms the basis of fundamental spoken language skills that

learners acquire first and precedes all other literacy skills (Lenyai 2013). As a result, no reading skills learning and development can occur if learners lack oral communication skills. As suggested by Kostelnik, Soderman and Whiren (2011), Grade R teachers, thus, need to provide lively language activities that will bring the content and the curriculum to the centre of learning in ways that nurture oral language proficiency.

The interview sessions revealed that the three respondents had limited content knowledge of teaching oral communication skills because they mainly focussed on teaching Braille codes with their rules and regulations. We also observed that in their classroom teaching, the emphasis was mostly on reading and writing Braille codes, without any attention given to meaning and reading for comprehension. For example, there was very little development of language and vocabulary through storybook reading and the enjoyment of shared stories. The oral communication skills they engaged in basically revolved around how to read and write letters of the alphabet in Braille. Attention was not even given to teaching phonics and showing the relationship between Braille dots and the sounds they represented while teaching the Braille alphabet. It was clear from the face-to-face interviews that the respondents lacked knowledge of the pedagogy to be used when teaching reading to Grade R learners with visual impairments.

Teacher Lefiso said:

Oooh.... I think Grade R learners who are visually impaired should be taught alphabet knowledge and oral language. The examples of alphabet knowledge are letters of the alphabet and their meaning, for example *A=a*, *B=bu*... *Z=zi*. (Interview, 16 August, 2016)

Teacher Tlhohonolofatso was not very confident about the way she teaches reading skills. She said:

Grade R learners who are visually impaired are taught the same reading skills that are taught to the learners who are sighted. I hope you know them as you are a primary teacher. Isn't it so? (Interview, 17 August, 2016)

Teacher Molebong said:

Mhm ... reading skills that are to be taught to Grade R learners who are visually impaired are picture reading, book knowledge and appreciation and alphabet knowledge. I teach them alphabets though sometimes it is very difficult. (Interview, 18 August, 2016)

During their teaching and learning engagements, all three teachers seemed to mainly focus on asking learners to identify the dots that represent the letters of the alphabet. Moreover, they seemed to teach Braille as a 'stand-alone' subject without integrating it with other knowledge bases or activities. Most of their activities involved oral questions and answers, and only a few learners were allowed to practise writing Braille codes. Although the curriculum expects these learners to be able to read words and sentences in real text, the learners were instead asked to say the dots of the

letters of the alphabet orally and then punch them out. Disconcertingly, the teachers never checked whether what the learners had punched was a correct dot or not.

When asked whether the teachers thought that teaching learners with visual impairments differed from teaching learners who are sighted, the respondents agreed that there was a huge difference between teaching learners with visual impairments compared with learners who are sighted. However, despite this agreement, the classroom observations indicated that their learners' special needs were not always being met. These findings suggest that it is important for teachers teaching learners with visual impairments to understand these learners' diverse needs and how to teach according to their strengths and weaknesses.

Book knowledge, appreciation and print awareness

Print knowledge is described as an ability to understand that print carries meaning and reading is done from left to right, and from top to bottom (Johnston, McDonnell & Hawken 2008). Doyle and Bramwell (2006) also refer to storybook knowledge and appreciation as an ability to convey a story, foresee the outcome of the read story and role-play the characters that appear in the story. Print and storybook knowledge is often acquired at home before children come to school. Book knowledge is one of the most complex abilities related to literacy, yet most reception year learners from poor and marginalised contexts usually only have their first encounter with books in school. For visually impaired children, exposure to storybooks in the home, if it at all happens, is usually via the oral medium because there are very few preschool storybooks for children in Braille, so they do not know how spoken language is represented in the tactile form.

Teacher Tlhohonolofatso said:

Because my learners are visually impaired, they rely on the information I give them about the book. I tell them about the book; its cover and pictures inside it. Our school does not afford to buy different books written in Braille. (Interview, 17 August, 2016)

However, her other two colleagues were not confident in explaining their knowledge for imparting literacy to their visually impaired Grade R learners.

Teacher Molebong said:

I usually read stories to my learners, they appreciate books much better that way. (Interview, 18 August, 2016)

Teacher Lefiso said:

It is really very complex to teach book knowledge and appreciation. I give my learners books and tell them how to page through and that books are read from top to bottom. The biggest challenge is that we have very few books and the ones we have are very heavy for young learners. (Interview, 16 August, 2016)

This finding suggests that teachers are not deeply knowledgeable of how to use different strategies and/or

instruments that could be used to assist learners who experience visual barriers in learning. It was clear that they lack PCK for teaching book knowledge and appreciation. Johnston et al. (2008) stress that in order for all Grade R learners to learn literacy concepts such as phonological awareness, print awareness, letter recognition and early reading skills, they need to be engaged in active and meaningful activities, experiences and opportunities which will allow them to explore, discover, manipulate, practice and even role-play.

Alphabet knowledge

Johnston et al. (2008) define alphabet knowledge as the ability to match or associate letters with their sounds. This means that learners at their emergent literacy stage need to have knowledge of how to identify letters and their sounds to acquaint themselves with literacy skills. According to Kostelnik et al. (2011), alphabet knowledge is about learning upper- and lower-case letters, differentiating between letters, knowing what sounds they represent and joining them to form words. In a context where learners are visually impaired, Erin and Wright (2011) state that a capitalised letter is preceded by the Braille capital sign (dot 6). If the whole word is capitalised, dot 6 is doubled. Phillips, Clancy-Menchetti and Lonigan (2008) point out that to develop alphabet knowledge in Grade R learners who are visually impaired, an alphabet Braille box or bag could be used as a free-choice activity where each letter of the alphabet is written in Braille and each box or bag contains objects that start with the alphabet or Braille-coded letter.

However, we conducted observations as one of the data generation methods during different reading periods. Clearly, teaching alphabet knowledge to learners with visual impairments is complex. The complexity is exacerbated when teachers have limited knowledge of teaching letters of the alphabet using Braille. Kostelnik et al. (2011) recommend that it is best for a teacher to adopt the simplest and most tactile method of getting learners to write the different letters of the alphabet. For example, the authors suggest that when making the letter 'a', a ball is placed in the first left column on the top of a muffin pan or egg box to resemble the dot on a slate. The remaining five holes will be empty. Similarly, Lewis and Iselin (2002) recommend that to give learners with visual impairments first-hand experience of the letters of the alphabet, a teacher could use a six-indented muffin pan and six tennis balls or a half-dozen egg boxes and six golf balls to resemble a cell from which letters are formed.

Phonological awareness

A literacy-friendly classroom environment should typically offer Grade R learners plenty of opportunities to explore, manipulate, discover and imitate different sounds in the words they hear. Phillips et al. (2008) state that a literacy-friendly environment should include various learning centres such as a library, a theme corner, a writing centre, an art centre and a fantasy play centre. Grade R learners can develop their phonological awareness through singing songs,

playing rhythm games, reading nursery rhymes, reading storybooks, sound identity tasks and syllable practice (Bester et al. 2013). Engagement in such activities assists young learners in developing their awareness of the sounds that occur within words, that words have meaning and are portrayed in different forms.

When interacting with Teacher Lefiso, she demonstrated an understanding that singing and rhyming are significant ways of enabling learners to develop phonological awareness.

I engage my learners in singing and rhyming. They enjoy that a lot as they learn sounds. They also spell out the names of body parts and through this their phonological awareness develops. (Interview, 16 August, 2016)

However, her other two colleagues showed more limited knowledge about teaching phonological awareness to their visually impaired Grade R learners.

Teacher Molebong said:

I try my best, but sometimes my learners fail to match sounds with the actual words or pictures when it is time for reading. (Interview, 18 August, 2016)

Teacher Tlhohonolofatso was uncertain and could not mention any reading components involved in teaching reading skills.

The above responses revealed that the respondents had difficulty articulating their knowledge of how to teach phonological awareness to Grade R learners. Their literacy (content) knowledge was also revealed to be very limited when we analysed their responses at a later stage. Teacher Lefiso and Teacher Moleboheng tried to identify reading components; instead, they specified the skills that need to be developed in Grade R learners. However, during their actual teaching and learning engagements, they sometimes engaged learners in oral language, alphabet knowledge and phonological awareness, although their PCK seemed to be limited.

Grade R teachers' technological knowledge of teaching pre-reading skills

The findings revealed that the sampled Grade R in-service teachers mainly focussed on teaching Braille concepts rather than teaching an array of pre-reading skills. When responding to how their learners who are visually impaired come to know how to read, all the in-service teachers emphasised that they usually introduce their learners to Braille codes or dots so that they could feel different shapes of different letters of the alphabet. As suggested by Schoenfeldt and Salsbury (2009), it was noted from the classroom observations that the sampled Grade R teachers engaged their learners in various textured activities such as moulding letters using clay or plasticine and also writing on sand to sharpen their fingertip sensitivity. They further indicated that learners who are visually impaired depend on their fingers for reading, and therefore they have to be involved in various activities so that

they will classify, identify and eventually read Braille dots and get meaning out of touch.

All the participants showed a good knowledge of the technology required to teach Braille codes and they all specified that they started with alphabetic Braille in Grade R and Grade 1; afterwards, they would introduce contracted Braille to their learners when they are in Grade 2 and continue until they reach Grade 7. The following were their assertions.

Teacher Lefiso said:

I teach my Grade R learners letters of the alphabet and their meanings using alphabetic Braille. Thereafter I do introduce them to contracted Braille when they are in Grade 2 classes, except for the letters which stand for words such as K for knowledge, P for people, E for every, etc. (Interview, 16 August, 2016)

Teacher Tlhohonolofatso said:

In Grade R I teach letters of alphabet orally focusing on Braille dots. (Interview, 17 August, 2016)

Teacher Moleboheng said:

In foundation phase we teach alphabetic braille especially in Grade R to Grade 2 then from Grade 3 we introduce our learners to contracted braille. (Interview, 18 August, 2016)

In response to the question why they started with alphabetic Braille and not contracted Braille, they all indicated that alphabetic Braille has no restrictive rules and regulations to abide by because every letter is expressed, unlike contracted Braille where a letter or group of letters could represent the whole word or letters in a word (Interview, 18 August, 2016).

Teacher Tlhohonolofatso said:

Contracted Braille is complicated because there are rules to follow; for example, this group of letters CH represent the word Child, CC in a word Accept will be represented by middle C. (Interview, 17 August, 2016)

Teacher Moleboheng said:

Contracted Braille has abbreviations such as BI for blind, abv for above, and many more. (Interview, 18 August, 2016)

Teacher Lefiso elaborated on the responses given by her colleagues by saying:

[C]ontracted Braille has short forms, contractions, word-signs, and group-signs which have rules and regulations that learners have to abide by; therefore as Grade R learners are still young we do not introduce them to Grade 2 Braille (contracted Braille) except for the letters of the alphabet which represent a word such as B=but, J=just, S=some, etc. (Interview, 16 August, 2016)

It was heartening that the interviews revealed that these in-service teachers had a very good knowledge of the technological tools that are supposed to be used to teach reading and writing using Braille.

Ethical considerations

Ethical clearance was received when Matiekase A. Kao was pursuing an MEd degree at the University of KwaZulu-Natal (UKZN). The clearance number is HSS/0615/015M.

Discussion of findings

This is a very small study, so generalisations cannot be drawn from it to the larger population. However, it has value in that it provides a snapshot, within a particular context, of Grade R in-service teachers' understandings of using Braille to teach pre-reading skills to Grade R learners with visual impairments.

Based on the data generated from the three Grade R teachers sampled in this study, the teachers seemed to have a rather narrow knowledge of literacy for the visually impaired learners. They were knowledgeable about the tools to be used to teach reading and writing (literacy) in Braille. However, these were traditional tools and there was a clear lack of modern Braille technology. In addition, they seemed to be unfamiliar with pedagogical approaches that promote the development of language and pre-literacy skills that support literacy – for both sighted and visually impaired learners.

Koehler and Mishra (2009) point out that it is essential for all teachers to possess knowledge of important concepts, skills and facts of a particular subject at different grade levels. Basically, teachers need to display their knowledge and ability to teach learners with diverse learning abilities and needs. According to Mandal (2013), it is crucial for teachers to possess knowledge of how to teach reading skills to learners with visual impairments. It was realised that the sampled Grade R teachers, during their actual teaching, predominantly focussed on developing Braille by instructing their learners to say Braille dots orally. Little to no attention was given to phonemic awareness, letter sounds or book knowledge and appreciation during their classroom activities. Only one of the teachers instructed her learners to spell out the names of body parts. The participant engaged learners in a play-based activity and did not put any emphasis on the letter sounds. Hugo (2010) recommends that teachers adopt play-based activities when teaching reading because play enhances cognitive development.

In light of our findings, we recommend that in-service teachers would benefit from meeting regularly so that they can share teaching and learning challenges, exchange ideas and discuss the various components of pre-reading skills and the different methods available to teach these in an integrated manner. We also recognise the need for teachers to discuss a range of possible activities that actively engage all learners in each pre-reading lesson.

Teachers' PK is a factor that needs to be enhanced. In-service teachers are expected to use a variety of teaching methods and materials to ensure that they accommodate diverse learners in their classrooms with diverse instructional needs. However, the teachers in this study seemed to rely

predominantly on one teaching strategy, namely, question and answer, where learners were asked to name the dots of the letters of the alphabet. They need to increase their repertoire of teaching strategies.

The selection of suitable teaching materials was another issue that was found to be challenging. Teachers seemed to rely predominantly on Braille counters and seemed to have limited knowledge of other options available. Therefore, we recommend that the Lesotho MoET holds regular workshops where literacy concepts and different strategies of teaching young Grade R learners who are visually impaired will be addressed. Furthermore, in-service teachers need to have refresher courses where they can exchange ideas in dealing with learners who are visually impaired and where they will also gain knowledge about current changes in Braille codes and Braille technologies. As Koehler and Mishra (2009) point out, Braille undergoes continuous changes, as it is a technology, and is thus prone to regular updates and the implementation of concomitant instructional approaches.

Conclusion

In conclusion, in this small study, we explored three Grade R in-service teachers' knowledge of teaching pre-reading skills to Grade R learners with visual impairments and observed them in their classrooms. The study revealed that the three Grade R in-service teachers sampled were unable to teach pre-reading skills using Braille; instead, they taught Braille as a stand-alone instead of integrating it with the teaching of reading skills in the early years of schooling. The literature on the teaching of visually impaired learners clearly indicates that there are three areas of knowledge needed for the teaching of visually impaired learners, namely, technological, pedagogical and literacy content knowledge. This threefold knowledge base needs to be centrally integrated into pre-service as well as in-service teacher training. The teaching of pre-reading activities to visually impaired learners and the proper development of their reading skills were found to be compromised as teachers lacked knowledge of how to teach reading as well as the necessary enabling resources that support visually impaired learners' literacy journey.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

M.A.K. provided empirical evidence from the data generated in Lesotho. M.A.K. also did the reviewing of different scholarly articles. P.J.M. provided the structure and conceptualisation of the article.

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Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Disclaimer

The information and/or data presented in this article are solely relevant to it. The information and/or data used were for research purposes only and can be used if acknowledged and referenced accordingly.

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