MY HANDS ARE MY EYES: THE USE OF TACTILE AND MODEL REPRESENTATIONS

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Abstract

Learners with visual impairments (LVI) in most education systems worldwide do not receive the attention they deserve. That happens in contrast to the call by international bodies to have specialised educators in place to cater for their needs in order for them (LVI) to be able to function in society. This study explored teachers' experiences with strategies for teaching LVI in special and inclusive classrooms in Oshana region of Namibia. The study employed a phenomenological design emanating from a qualitative approach. The sample of the study consisted of fifteen secondary school teachers that teach LVI. Individual interview was the predominant method of collecting data, augmented by classroom observation and document analysis. The findings of the study revealed that; although teachers were willing to use appropriate teaching strategies, in some cases, they lacked the skills to create, develop and use tactile materials correctly. The findings also revealed that, schools have a shortage of ready-made tactile materials. As a result, LVI were made passive, for they could not participate actively in the classroom activities. It is therefore important for teachers to receive training on how to create and develop teaching materials such as tactile and model representation for LVI.

Keywords: *Visual impairments, tactile model, kinaesthetic, phenomenology and Namibia*

Introduction

Visual information plays an important role in the teaching and learning process of all learners despite their physical well-being. The significance can be attributed to the picture the eyes offer to the mind in order for one to observe and interpret their environment. Whereas that is a general view, it might be biased as it does not put into consideration LVI. Visual impairment is defined as a functional limitation of the eye(s) or visual system that interferes with one's ability to perform activities of daily living as well as ability to read standard-sized print (Freeman, Cole, Faye, Freeman, Goodrich, & Stelmack, 2007). As a result, LVI struggle to access printed information in general education classrooms. It is important to highlight that LVI are not homogeneous and access requirements of LVI vary widely. Therefore, the nature of support needed vary depending on the degree and nature of their impairment. Despite that significance, it appears that education of these learners has not been prioritised. That happens despite the demand by the current Namibian, as well as, international education systems that LVI should be taught alongside their sighted peers (Ministry of Basic Education and Culture, 1993; Sector Policy on Inclusive Education, 2013; UNESCO, 1990). For example, The United Nations Educational Scientific and Cultural Organization (UNESCO) stipulates that specialised and general teachers should have adequate knowledge in order to be able to support LVI in real classroom environments. Alike, The National Policy on Disability in Namibia (Government of Namibia, 1997) alludes that all relevant information, teaching and reading materials for LVI be made available in Braille and or in other tangible/ touchable objects. In the Namibian education context, such has not been fully implemented; and thus, the performances of LVI is a matter of serious concerns for policy makers, teachers and parents alike.

The Namibia Curriculum Framework for Inclusive Education (2014) emphasises that LVI should be taught and to be able to use the Braille and other assistive devices such as embosser with slate and stylus to write Braille. In addition, LVI should learn to use mathematical signs, symbols, alternative notations and abbreviations; as well as apply through feel and touch of tactile materials. It is, however, reported that although the government policy enhanced access to education for learners with disabilities in Namibia, the education of LVI did not receive adequate support from the government and other stakeholders (Josua, 2013). As for Kahikuata-Kariko (2003), the quality of teaching provided in these institutions is seriously and continues to be compromised. In that vein, researchers (Tobias, 2017; Josua, 2013; Kahikuata-Kariko, 2003; Mostert, 2002) attribute the challenges to the fact that that the majority of teachers in regular schools are not trained to effectively teach learners with disabilities.

Owing to the fact that LVI have different levels of impairments, a large number of them who are total blind rely on using their 'hands' (especially fingers) to read tactile and model materials in order to obtain and convey non-textual information. Contrary though, most of the teachers use pictures, photographs and a variety of color-coded materials in their classroom instructions. Alike, some teachers (at times) also make use of un-brailled textbooks and modelling as teaching aids for LVI, which require a learners' visual attention (Downing & Chen, 2003; Tobias, 2017). So, doing results in LVI, who are total blind, finding it difficult to follow the ensuing verbal information. It is, thus, important for teachers who have LVI in their classrooms to accommodate these learners with needs and style (Tobias, 2017; Downing & Chen, 2003; Alberto & Frederick, 2000; Hodgdon, 1995; Hughes, Pitkin & Lorden 1998). In Downing and Chen's (2003) views, LVI teachers must resort to alternative teaching strategies incorporating tactile representations of pictures, maps, graphs,

diagrams and other images in Braille. So doing affords LVI to feel the embossed lines and surfaces and obtain the same information that other learners will acquire through looking at the pictures and other visual images.

Education of Learners with Special Educational Needs in Namibia

It has been indicated that, the history of educating children with disabilities in Namibia is both recent and short (Reynolds & Janzen, 2007). Drawing reference to the pre-independent Namibia, Reynolds and Janzen (2007) highlight that, most (if not all) of the Namibian black community was left with little or no education by the defunct administration of the South African apartheid system before the political independent of Namibia in 1990. That found the first special school for children with disabilities, the Dagbreek School in Windhoek, established in 1970. Having been established during the colonial regime, the school (then) was a racially segregated facility for white children only. Its doors were just opened to children with disabilities from other races after the country's independence. The second special school to be opened was, the Eluwa special school for LVI and learners with hearing impairments (LHI). The Eluwa Special School was established in 1973, with an enrolment of 20 LHI and 20 LVI. The school is situated in Ongwediva, in the northern part of the country. The third special school, Môreson School for children with severe learning difficulties was established in 1976, in Windhoek. The school was established and privately run by the Association of the Handicapped until it became a government school in 1990 (Bruhns et al., 2007).

Teacher's Development: General and Special Teacher Education

In Namibia, the responsibility for pre-service and in-service teacher training programmes lies with the National Institute for Educational Development (NIED) under the Ministry of Education (MoE) (Namibian Ministry of Basic Education and Culture, 1993). The execution of teaching on the other end differed from independence to 2011. Then, training for the primary, junior secondary and senior secondary phases teachers was the duty for the colleges of education. Secondary education teachers were being trained by the University of Namibia (UNAM) (Ministry of Basic Education and Culture, 1993). As indicated earlier, before 2011, the Ministry of Education managed four colleges of education, which offered a three-year Basic Education Teacher Diploma (BETD) until April 2010. After that, the government decided to merge the colleges into the Faculty of Education of the University of Namibia (MiETAfrica, 2013); which only catered for secondary teacher education phases and postgraduate qualifications with specialisations prior to the merger. At present, NIED, UNAM, Education Training Sector Improvement Progress (ETSIP) and National Professional Standard for Teachers in Namibia, all focus on professional growth as well as pre- and in-service training for teachers in special and regular schools both in the primary and secondary phases (Government of the Republic of Namibia in 2006, 2011 and 2014).

As a measure to include LVI in the access to education, The Department of Educational Psychology and Inclusive Education of UNAM requested the Senate to approve some other stand-alone inclusive education qualifications. Although much has been done to sensitise teachers on the issue of including learners with special educational needs (including LVI) in regular schools, many teachers still have mixed feelings and attitudes towards the inclusion of learners with special needs (LSEN) in their classrooms. For example, it is indicated that regular classroom teachers continue to express fear of the inclusion, believing that they are not adequately prepared to handle special needs education challenges within a regular classroom (Haihambo-Mwetudhana, 1999). The challenge is attributed to the fact that, the majority of teachers are inadequately equipped by either the pre-service or in-service training to manage students with diverse educational needs in their classrooms

(Chiner & Cardona, 2013); Josua, 2013); Mangope & Mukhopadhyay, 2015). All posit that Several studies also point out that found that majority of teachers had not received training in inclusive and special education during their pre-service teacher qualification (Holdheide & Reschly, 2008; Mostert, 2002; Philpott, Furey & Penney, 2010). Below, we share some individual studies with regards to challenges facing inclusive education in the Namibian context. Mostert (2002) conducted a study on teachers' perceptions about the inclusion of learners with special needs (LSEN) in Namibian regular schools. Her study's findings indicate that when LSEN were included in regular classrooms, most - if not all, of the teachers could not give the adequate support to such learners. He attributes that challenge to a lack of teachers' training in the area of special education (inclusive education). Other than that, findings of a recent study by MiETAfrica (2013) indicate that the Faculty of Education graduates from UNAM, who were appointed in special and inclusive schools, have often reported of difficulties in executing their duties. The teachers (that were participants) attribute the challenge to a lack of practical teaching skills, due to the fact that such component(s) was not included in their pre-service teacher education programmes. Contrary though, it is further argued and noted in the same study that, unfortunately many teachers do not 'also' practise what they were even taught (MiETAfrica, 2013). That can, in principle, be viewed in light of Josua's (2013) study on challenges facing the management of GTISS with regards to the inclusion of LVI. The study revealed that the school was managing inclusive education as if it was an extra duty; and the MoE did not adequately support the school in terms of the provision of staff training and learning materials for LVI.

Looking at the picture, as painted by the scholarly works above, it is clear that that there are a number of impediments to the implementation of effective teaching strategies for LVI. To share such thematically, those include attitudinal barriers, school and classroom atmosphere, infrastructural and structural barriers and most importantly, budgetary constraints. It is against that background that this study explored teachers' experiences in designing, implementing and using tactile and models representations for LVI as required for teachers in special and inclusive schools.

The Importance of Using Tactile and Models Representation

Tactile and kinaesthetic materials were pointed out as the most effective for presenting information to LVI about objects that they come into contact with and use in their everyday lives. Tactile media is described as materials with some physical property (ies) which are adapted to be used by LVI in order to enable them to use their sense of touch to read (Cox & Dykes, 2001). In order for that to be attained, some effective teaching strategies could be used to teach LVI in general education settings. Those include: a) tactile and kinaesthetic materials; b) auditory learning accommodation; c) different technology adaptations; d) curricular consideration; e) orientation and mobility and f) activities of daily living (Cox & Dykes, 2001). Further, the authors suggest that teachers in special and inclusive classrooms should plan and adapt the materials, such as charts, models, maps and graphs beforehand for LVI who do not have the necessary skills required for the task. That, in essence, is indicated to have greatest educational value as they enable LVI o read using the sense of touch.

A similar study, on investigating the perceptions and practices of teachers of LVI, was conducted in Canada and the United States of America by Zebehazy and Wilton (2014). The nature of their study was a survey, while the focus was on the graphics (tactile and print) used by students with VI. Their findings revealed that 70% of teachers of LVI who responded to the survey valued the importance of using tactile media and print. It further indicates that the teachers of LVI felt that graphics (tactile or print) were effective in teaching

concepts; and graphics were best understood by LVI when written descriptions are paired with tactile compared to giving them (LVI) written descriptions alone. Whereas that indicates the significance of using tactile and printing materials in general, the study reported that less attention has been paid by teachers with regards to teaching LVI how to make their own tactile graphics. Specific accommodation and adaptive equipment that teachers could use when teaching LVI are better described by Wagner (1995) that;

"Tactile measuring tools for LVI are prepared by photocopying sections of a meter scale onto transparencies and pasting the cut section into a meter-long scale, using staples or glue to emboss each centimetre marking. The LVI may use this tactile scale to practice measuring objects; such activities should help them to gain self-confidence in skills easily transferable to real life (p.77)."

Cognisance should be taken that, although some studies (Cox & Dykes 2001; Zebehazy & Wilson, 2014) revealed the importance of using tactile representations to teach LVI, it is not clear in the literature how this could be implemented in an African context. to explore teachers' experiences in creating tactile and models representations, as some of the strategies for teaching LVI in special and inclusive classrooms, in the Oshana region of Namibia. It further aimed to identify and understand the teaching strategies that LVI teachers employ to promote effective learning in inclusive and special education classrooms.

Methods

To better understand and interpret the meanings that teachers of LVI experienced through creating, developing and implementing tactile and model representations in their special and inclusive classrooms, an interpretive paradigm was used in this study. Denhart (2008) indicates that in qualitative research, the voice of an individual is very important and needed. Therefore, through using phenomenology design, the voices of the experienced teachers in using tactile and model in teaching LVI were heard, explored in-depth, interpreted. So doing enabled the researchers to gain a greater understanding of the strategies that promote or hinder the effective teaching of LVI.

Research Setting

The Directorate of Education, Oshana Region in the Northern part of Namibia, has 136 primary and secondary schools taught by 2100 teachers. Amongst the 136 schools, six are boarding secondary schools; inclusive of two schools (Eluwa Special School (ESS) and Gabriel Taapopi Inclusive Secondary School (GTISS) catering for LVI. The two schools for LVI have a combined staff of 50 teachers, including two school principals, for ESS has a total of 13 teachers from orientation to grade 10, while GTISS accommodates 37 teachers from grades 8 to12.

Participants

Out of 13 teachers at Eluwa, 1 school principal, 1 teacher assistant and five (5) teachers teaching Grade 10 participated in this study. Further, out of 37 teachers from GTISS, 1 school principal, 1 teacher assistant and six (6) teachers teaching Grade 12 participated in the study. Figure 1 describes the process of selection of participants.

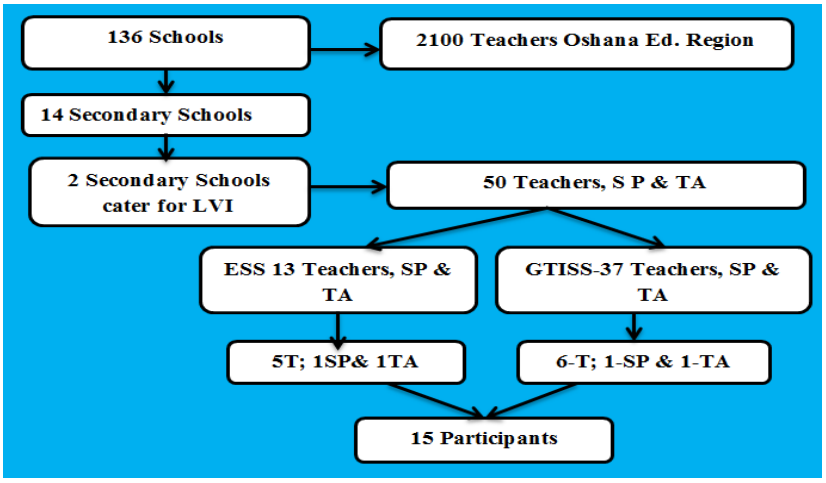

Figure 1: *Process of Selection of Participants*

These two schools and their teachers were purposively selected for their uniqueness. They accommodate LVI, as well as sighted, and teachers with VI. ESS and GTISS have five elements in common, and these were used as a set of inclusion criteria for schools as part of the sampling procedure. The interrelationship of the two schools is that when LVI complete Grade 10 at ESS, they are transferred to GTISS which caters for LVI and sighted learners in grades 11 to 12. The two are boarding schools in Ongwediva, Oshana region and could be easily reached by the researcher. The study comprised of fifteen teachers of which six were males and nine were females *(See Table 1).*

Table 1

Demographic Information Background of the Participants

Participant Pseudo-Name	Sex	Age	Qualification	Subjects and Grades	General Teaching Experience	Experiences in Teaching LVI	School
School P Tate	M	43	PGDE	Accounting 8 & 11; Economics	16 Yrs	16 Yrs	GTISS
School P Suzy	F	53	NHPD	Home Economics 8-10	28 Yrs	21 Yrs	ESS
HOD Shiwo	F	56	NCE	Grades 0-4	32 Yrs	32 Yrs	ESS
Teacher Tulonga	F	36	BETD, BEd, Masters	Entrepreneurship & Computer 8-10	12 Yrs	7 Yrs	ESS
TVI Hannover	M	36	BETD, BEd in Lang.	English	6 Yrs	6 Yrs	ESS
Teacher Chen	M	35	BETD & ACE	Life Science & Agric Sc. 8- 10	5 Yrs	5 Yrs	ESS
T VI Ndahafa	F	31	BETD & BEd	English & Oshikwanyama 8- 10	6 Yrs	6 Yrs	ESS
Teacher Neka	M	27	BEd in Bio & Geog,	Bio & Geography 11 & 12	4 Yrs	4 Yrs	GTISS
Teacher Lela	F	57	HEDAl.	Oshikwanyama 11-12	35Yrs	7 Yrs	GTISS
TVI Role	M	29	BETD	English & Braille 8-10	6 Yrs	6 Yrs	GTISS
Teacher Mbili	M	34	BETD	Development Study 11&12	14 Yrs	4 Yrs	GTISS
Teacher Briana	F	29	BEd in Eng & Biology	English 11& 12	8 Yrs	4 Yrs	GTISS
Teacher Mwetu	F	36	PADE	Agricultural Sci. 11& 12	8 Yrs	5 Yrs	GTISS
TAVI Ndapanda	F	29	BETD	Braille and de-brailing	6 Yrs	3 Yrs	ESS
TA Mkize	F	40	BETD	Braille and de-brailing	18 Yrs	15 Yrs	GTISS

Key: PGDE- Post Graduate Diploma in Education, NHEC- National High Education Certificate, NEC- National Education Certificate
BETD- Basic Education Teacher Diploma, BEd- Bachelor of Education, ACE- Advanced Certificate in Education
HEDAL- High Education Diploma in African Language, PADE- Post Agriculture Diploma in Education, ESS- Eluwa Special School and GTISS- Gabriel Taapopi Inclusive Secondary School

The participants ranged from the age of 27 to 57 years and they teach different subjects. In this case, all teachers who had taught LVI in the two selected schools for at least two years participated in this study. These teachers were considered information- rich cases because they were familiar with creating and developing tactile and model representation, had experience in using methods and strategies for LVI, for example, tactile media and models, as well as Braille.

Data Collection Instruments

We used Semi-structured one-on-one interview guides for teachers, schools' principals and for assistant teachers. Also, semi-structured focus group discussion for special and inclusive schoolteachers; non-participant observation guide for classroom setting and lesson observation, as well as document analysis guide. Both guides had common items. Since some of the participants were teachers with VI and use Braille, one-on-one interview guides for teachers and teacher assistant and focus group discussion for teachers and for teacher assistants were Brailled. All the interview guides were carefully designed by clearly stating and introducing the researcher and explaining the purpose of the study. The interview questions in the interview guide were open-ended and could accommodate new information which might not have been expected from the participants. The interview guide began by asking participants about their background information regarding years of experience in the field of education in general, as well as in special and inclusive education. Participants were asked to reflect on their experiences in teaching LVI and describe their experiences fully in using tactile and developing models (Moustakas, 1994). Interview guides were also designed based on research sub-questions presented earlier and based on relevant information from the literature review. The interview guides for teachers from ESS and GTISS had common items.

Data Collection Procedure

Prior to data collection process, the first author wrote a letter to the Permanent secretary's office MoE requesting for a permission to conduct research in the aforementioned schools. Research permits were sought from Office of Research Development at the University of Botswana and Permanent Secretary Office and Oshana Education office. The researcher visited schools and explained the purpose of the study, consent forms and familiarising with the environment as well as creating rapport. Confidentiality and anonymity were maintained by assuring the participants that their real names would not be used. Participants were aware that their participation was voluntarily, and they had the right to withdraw at any time. Appointments were made with the participants who agreed to participate. The researcher, then, recruited a research assistant who is a teacher with VI.

Data Analyses

Data were analysed following the process of open coding and thematic analysis (Creswell, 2012). This is the practical process of working and communicating with the data; and in the process discovering what is important and deciding what to communicate to targeted audiences. Therefore, the data from the voice-recorded interviews were transcribed using NVivo Pro software through a step-by-step process of listening word-by-word, typing and going back and forth for clarity. The transcripts were then carefully studied and analysed with the purpose of familiarising oneself with the data. This process was carried out on all the data from the interviews and observations. The data were then analysed by reading and following line by line and sentence by sentence. Then each transcript was studied separately, and whenever a new theme and pattern emerged, it was

highlighted. All the identified meaningful themes within the transcript were then compared across transcripts. This approach was followed for each transcript during data analysis. The overall themes were: the use of tactile; utilization of models; challenges in the use of tactile and models.

The data from multiple methods of data generation were triangulated to reach a common understanding. The transcripts were translated into Braille by using the Duxbury programme and then printed into Braille using an embosser. The brailled transcripts were given to the teachers with visual impairments and then read through together with the researcher. This was done to ensure that the data was, in fact, the same and that the detail in both sheets of information did not carry different meanings or interpretations. However, using three dots (ellipses) in a print transcript some created a new meaning in the Braille sheet when compared to the print document. These dots were then corrected and the document was transcribed into Braille. Sighted teacher participants interviewed were also given transcripts to read by themselves for member-checking. In order to protect the identity of the participants and the confidentiality of the data, the researcher assigned pseudonyms which were allocated to all participants.

Findings

Use of Tactile Materials

Tactile materials were described by participants as manufactured brailled articles that LVI touch, feel and visualise to make sense out of what is being taught (see Figure 2). However, 20% of the participants noted that tactile articles were more effective compared to models because of their mode of manufacture.

Figure 2: Illustrations of Tactile Material

Further, the participants revealed that one major benefit was that tactile articles were manufactured with accuracy which provided LVI with a clear proportional picture in their imagination of the real object. One participant, Hannover shared his experience in using tactile materials which he encapsulated in the following words “I use manufactured tactile pictures, especially when we are dealing with a new concept that requires LVI to touch/ feel and connect with real life situations. This helped the LVI to carry out activities during the lesson.” In support of Hannover’s sentiments, Neka felt that the use of tactile materials enhanced LVIs’ visualisation of the concepts and objects by saying:

Tactile or concrete materials work well because they help learners visualise real life and in that way the teacher’s lesson also goes well. Sometimes a teacher can explain by giving examples like, ‘this is a lizard...this is how it looks like...this is a plant and these are leaves, this is how they feel like...Yeah!

Additionally, Lela explained that the use of tactile materials had dual benefits as it allow both the teachers and learners to understand concepts easily. She further said "You know the use of tactile strategy benefits both teachers and LVI...in a way that it helps an individual to explain and visualise the object/ concept in real life. In fact, tactile materials are easier to understand than models." Ndahafa, a teacher with visual impairment reveals the following: "Our hands are our eyes" when we are feeling and touching the objects with our hands, it is like we are looking at those objects.

From the teachers' point of views, engraved materials when used as a teaching strategy added a concrete dimension or finishing touch to the lesson. This contributed to the effectiveness of the teaching and learning experience of both LVI and teachers. It also helped the learners to internalise what is being taught through touching and visualisation.

Utilisation of Models

During interviews, about 20% of the participants generally agreed that a model is a tangible object made by an individual to be used as a teaching and learning aid. Participants expressed the vital role that a model can play during teaching and learning of LVI *(see Figure 3).*

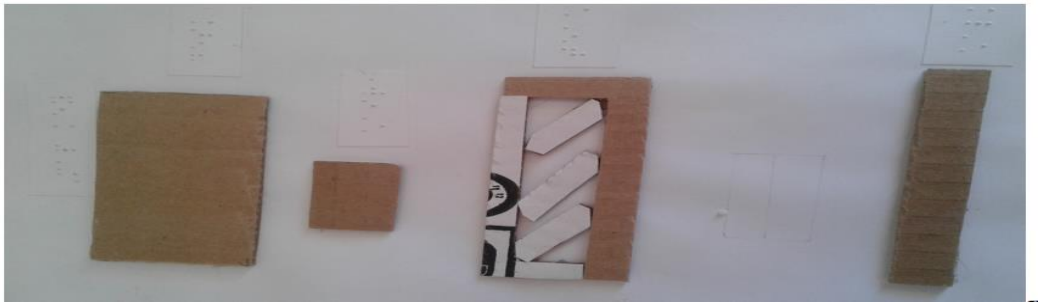

Figure 3: An illustration of a Model

A model provides an opportunity for the effective teaching of the LVI and his or her learning through touching, feeling and visualising the concept. For instance, Tulonga, a teacher at ESS, explained that a modelled picture works effectively as it helps to form a picture of the object and concept in the mind of the LVI. In addition, Hannover, a teacher with a visual impairment defined and explained in detail the use of a model:

If you are talking of animals, kids who have never been at national parks where wild animals can be found would not know how they look like, so what you should do is to bring models so that they can see, touch and feel. So you have to make sure that you bring models to class...A brailled model is a tangible item that LVI are able to touch and on that basis answer questions based on the activity.

Expressing a somewhat different view, Neka shared his experience of using unbrailled models in his lessons. He felt that an integration of various types of models was effective when teaching LVI and learners who can see. He stated that:

I also use models...uhm...in my Biology lessons. We get the models from the Teachers' Resource Centre...for example in a lesson for a human heart. I draw a heart on the chalkboard for those that can see and I give the model of the heart to those who cannot see, so that they can touch and feel it.

Observing how the teachers' experienced using models as a teaching strategy, participants agreed that teachers of LVI needed to use various types of models when teaching. In addition, this strategy enhances the teaching and learning process.

Challenges in the Use of Tactile Media and Models

Despite the fact that the participants identified benefits in using effective teaching strategies with LVI, they lamented the inconsistency due to lack of skills and materials in schools. All 15 participants felt that the unavailability of tactile media and models disturbed the teaching and learning process. In addition, amongst all the 15 participants only 27% teachers of LVI pointed out that they also experienced difficulties in explaining what they were teaching, especially non-representational concepts, information in pictorial form and diagrams in the textbooks and the use of blackboards. The teachers further claimed that lack of skills when teaching LVI forced them to leave the LVI to struggle on their own or learn from their peers. Ndahafa, a teacher at ESS with a visual impairment, was concerned about the absence of tactile media and models in the schools.

"Uhm...technology/machines are now available to draw pictures that people with VI can use, touch and see...but then we don't have them...this is a big challenge for us as teachers...and also for the learners. This makes it difficult for LVI to perform in class and in national exams...especially when they have never come across material...it will not be easy to answer questions. The lack of materials is a challenge and needs to be addressed."

On the same issue, during the focus group discussion with teachers at GTISS, Mwetu claimed forcibly that teachers were not using tactile media or models in their respective classes. For example, she explains that:

"…this is really a challenge...I have never seen a teaching aid...or to say a model about nitrogen or the oxygen cycle in braille...when I am teaching a topic which includes for example the nitrogen cycle...my LVI are left behind...others can see...there are no machines to make diagrams in our school and no promise of getting them...so I just have to make my explanation more clear, though it is difficult."

A Biology teacher at GTISS, Neka, was discouraged when he was teaching and failed to include LVI in his lessons. Such instances made him feel like he is an unskilled teacher. He said "When explaining a microscopic virus diagram from a textbook during my Science subject, I use a plotting code which is difficult for the LVI to visualise the pictures in their mind... I am an unskilled teacher."

Although Mkize, a teacher assistant at GTISS agreed with the views expressed by other teachers of LVI, she felt that the teachers were not ready to create, produce and use models in their lessons. Speaking from her experience as someone who assists teachers of LVI and LVI in the creation and use of visual impairment-related materials, Mkize said that:

"In terms of assisting teachers and LVI, they need unique teaching aids. Sometimes I help by showing them how to create the different teaching aids...Other times I explain the importance and how to use the models. This is done to enhance the classroom attendance of LVI...since their attendance is sometimes poor."

The findings revealed that teachers were willing to use appropriate teaching aids, but in some cases, they lacked the skills to create, develop and use such materials correctly. Participants felt it is important to receive training on how to create and develop models.

Discussions

The study explored the experiences of teachers in using strategies for teaching LVI in their respective classrooms. The study identified Tactile and model representations as effective strategies to use when teaching LVI aided with any teaching method and relied heavily in their practice. Regrettably, despite these effective methods and strategies, the teachers lacked skills and knowledge in their application. Notably, a few teachers were formally trained to teach LVI, while the majority of the teachers involved were not qualified or were under-qualified to teach LVI. Their lack of skills and knowledge in teaching LVI resulted in poor delivery of lessons, consequently affecting the performance of the LVI. Apart from the teachers' incompetency, the supplementary curriculum to guide delivery and appropriate induction for its use was hardly consulted.

The use of concrete materials, models and tactile media refines the lesson and contributes to the effectiveness of the teaching and learning processes for both the teacher and LVI respectively. The application of models and tactile media helps the teacher to explain easily and concisely what is being taught. It further enhances the internalisation of what is being taught through touch and visualisation. In support of this finding, Cox and Dykes (2001) emphasise that kinaesthetic materials are effective when presenting information to LVI since they encounter objects which they use daily.

Cox and Dykes (2001) suggest that teachers of LVI should plan and adapt the materials beforehand. The early preparation of materials assists the teacher to transpose objects, maps, graphs, and charts into formats (tactile forms or models) that add a greater educational value for LVIs' sense of touch. Wagner (1995), Zebehazy and Wilton (2014) also propound the value and the importance of using tactile materials in the teaching of LVI. Nonetheless, the identified lack and use of models and tactile materials remains a challenge leading to adverse implications for teacher practice and LVI learning. For teachers, the skills required to use these materials may be forgotten whereas for LVI, the non-use of the materials may affect their scholastic performance.

The study established that teaching strategies for LVI include ways, approaches and tactics that teachers use to make the learners understand by using tactile, models and tangible representations. One thing important is that, a teaching strategy cannot be effective in the absence of a teaching method; both cannot exist without each other as a teaching strategy relies on the teaching method and vice-versa. For example, sighted learners provided with pictures while LVI are provided with tactile and model pictures which allows them to actively engage and interact with their peers and teachers. The participants expressed evidence of over reliance on support systems, whereas newer teachers support the use of assistive technology within the classroom. In this study, structures of support were characterized by the support systems within the school and these support

systems are related to how teachers were providing support, and the involvements of peers were found to be insignificant.

Braille is a means of communication for individuals with VI, specifically in accessing information through reading and writing. While the use of Braille materials was supported by teachers, the study identified a serious gap: some teachers in the special school were unable to apply braille materials and none of the teachers at the inclusive school was able to use braille. Instead they depended on the teacher assistant. This view was supported by Fraser and Maguvhe (2008) who reported that most educators involved in teaching LVI had inadequate skills resulting in low motivation to teach at special and inclusive schools. This practice is congruent with Fraser et al., (2008) who concluded that teachers lack ideas and planning skills to adapt teaching resources in order to accommodate LVI. The correct application of Braille materials cannot be over emphasised. Erwin et al. (2001), Rooks et al (2009) and Wagner (1995), valued and acknowledged the adaptation of teaching and learning materials to enhance communication in class. In fact, for effective teaching and learning and better performance of LVI, it is critical that teachers for LVI should be equipped with skills to read and write Braille contractions. This would enable them to braille and de-braille the learners' activities and also provide the necessary support.

The use of concrete materials (models and tactile) smoothened the lesson and contributes to the effectiveness of the teaching and learning processes for both the teacher and LVI respectively. The application of models and tactile helped the teachers to explain easily and concisely what was being taught. It further enhances the internalisation of what was being taught through touch and visualisation. In support of this finding, Cox and Dykes (2001) underscored that kinaesthetic materials are effective when presenting information to LVI since they come into contact with objects which they use daily. Cox and Dykes (2001) suggested that teachers for LVI should plan and adapt the materials beforehand. The early preparation of materials assists the teacher to transpose objects, maps, graphs, and charts into formats (tactile or models) that add a greater educational value for LVIs' sense of touch. Further, Wagner (1995), Zebehazy and Wilton (2014), propounded the value and the importance of using tactile materials in the teaching of LVI. Nonetheless, the identified lack and use of models and tactile materials remains a challenge leading to adverse implication for teacher practice and LVI learning. For teachers, skills to use these materials may be forgotten, while for LVI, non-use of the materials, may affect their performance.

The use of effective teaching strategies assists the teachers to understand LVI and their needs. When teachers are competent to use effective teaching strategies, for example, Brailling, de-brailing and using braille contractions in teaching, they prepare the lessons and meet LVI learning needs through providing the necessary support in their classrooms (Erwin et al, 2001; Rule et al., 2011 & Twohig, 2000). Again, using effective teaching strategies for example, ICT like computer with Jaws programmes and Duxberry, makes the teacher active, improves confidence and brings satisfaction in their work. In addition, it creates passion to teach LVI which instils self-motivation and encourages self-evaluation. On the other hand, the use of effective teaching strategies encourages the teacher to apply techniques like scaffolding which accelerate the teaching and learning of LVI.

The study identified frustrations regarding the teachers' unpreparedness to use specific strategies for teaching LVI. Specifically, all teachers at the inclusive school and some teachers at the special school faced challenges to braille and de-braille their LVI's activities. Several studies supported this finding (Habulezi, 2012;

Josua, 2013; Mwakyeja, 2013). These studies found that teachers lacked knowledge and skills in teaching LVI which hindered their progress in delivering proper and effective teaching.

This challenge is compounded by the presence of specialist teachers who are normally not conversant with the teaching of LVI. A study conducted by Habulezi (2012), supports this finding. In his study Habulezi discovered that most specialist teachers do not actively support LVI academically due to lack of braille skills. This resulted in teachers doubting their teaching potential which in turn led them to continue ignoring and neglecting LVI. On a different note, the study found that it was difficult for inclusive schoolteachers to teach LVI and sighted learners in overcrowded classrooms. This challenge was extensive and required creativeness on the part of the teachers. To curb the challenge of overcrowded classrooms, Mitchell (2008), suggested the use of teaching methods like group discussion when teaching large classes.

The study identified a shortage of Braille writers (Braillers) and Braille papers (Braillons) in the schools. This challenge prevented both the teachers and LVI to complete their planned lessons and learning activities on time. As earlier alluded, that there is a lack of Braillers and Braillons, so how can LVI perform well if not provided with necessary basic equipment? The Government of Namibia (2014) is aware of this challenge and recommended that Braillers, Braillons and other adaptations should be provided to cater for effective and individual teaching and learning needs. Regrettably, the special and inclusive schools had a challenge of receiving Brailled materials (Brailled textbooks, examination question papers and practical sheets for classwork activities) on time or not at all.

Another pertinent issue was the availability of the two faceted times required. Teaching LVI required time for the lesson (40 minutes period) and extra time to ensure that learners have completed their tasks. The allocated time for the lesson was not adequate to complete the lesson activities as well as provide support for the LVI since they required extra time compared to their sighted peers. This finding echoed Mwakyeja (2013) and Penda et al (2015) who suggested that LVI and their teachers be given extra time. According to the Government of Namibia's (2014), a supplementary curriculum framework for inclusive and special education, timetabling should be done in such a way as to provide opportunities for longer teaching and learning sequences, cross-curricular teaching, and project work. Double lessons should become much more usual than at present, to enable LVI to complete their activities. However, due to a common timetable and subjects that are offered in the special and inclusive school such stipulation has not been implemented yet (Mangope & Mukhopadhyay, 2015).

The school support systems existed however this study learned that they lacked the necessary strength. In order for the systems to function to their full potential and provide the much-needed assistance to the sighted teachers, teachers with VI and LVI, the systems needed to be well coordinated. The importance of support through provision of resources and sufficient training for school principals and teachers was expressed by Landsberg and Gericke (2002). Twohig (2000), reported that the school principals play a major role in the provision of all the necessary equipment, sufficient instructional materials and teacher assistants to support regular and special teachers.

The Ministry of Education (2014) implemented a supplementary curriculum for special and inclusive school for teachers to use. The curriculum explained the support that teacher assistants were expected to render. For instance, at Gabriel Taapopi inclusive school, the teacher assistant was largely responsible for coordinating

the resource room and assisting both teachers and LVI in the creation of Braille materials and de-brailling of materials. However, this study revealed that at the inclusive school, teachers for LVI and teacher assistant did not have adequate support. On the other hand, and encouraging, the teacher assistants at special school were of the view that teachers with visual impairment were fully supported. But overall, school management acted as the pivot for supporting the teachers and LVI.

The study identified several ways to strengthen the teaching strategies for LVI in special and inclusive schools. Firstly, the research suggests strongly the need to increase budgetary allocations and remittance of funds to enable the purchase of all the necessary teaching and learning equipment for LVI. Secondly, the study proposes regular in-service training programmes for teachers teaching LVI and all stakeholders in their areas of need (Operation of Embosser, Braillers and ICTs). Thirdly, that the supplementary curriculum for special and inclusive schools should be deployed to all schools and centres to guide the teachers. However, there should be proper orientation of the teachers on how to use it correctly. Fourthly, that at the Teacher Resource Centre, the Government should appoint an experienced and knowledgeable staff with visual impairment related abilities. The appointed staff could anchor and support Advisory teachers who work closely with teachers with visual impairment and schools catering for LVI. It is believed that doing so might in turn accelerate the training and examination processes of the teachers and LVI.

Conclusion and Recommendations

This paper is part of a bigger study that explored the experiences of teachers for LVI in using various teaching strategies in a special and inclusive school in the Directorate of Oshana Region. However, this paper only presented the use of tactile and model representations. The study was carried out in two schools that cater for LVI and the results cannot be generalised to other schools or regions. However, the findings provided information for a more in-depth understanding of this particular context and the phenomenon. The study established that teaching LVI is a demanding undertaking that requires competent teachers and assistants to manage teaching, learning and assessment of the LVI. These conclusions demand regular and specific training programmes, appointment of relevant personnel at the regional office, collaboration and supply of LVI teaching and learning resources.

Policy and decision makers should inform Governments to increase the budget for special and inclusive schools for the purchase of machinery, materials for LVI and in-house training. The current study was a qualitative research and focused on the experiences of teachers in the classroom practice and did not emphasise teacher preparation and continuous professional development. However, to gain more insights about how to teach and manage LVI; there is a need for further quantitative and mixed methods research studies. Thus, future researchers may evaluate the effectiveness of teacher preparation for teaching and learning of learners with visual impairments.

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