Journal of Geography Education in Africa (JoGEA)

Journal of the Southern African Geography Teachers' Association sagta.org.za

NPC: 2017/035104/08

Namibian teachers' perceptions and practices of teaching mapwork

Johanna Naxweka[1] and Di Wilmot[1*]

[1]Education Department, Faculty of Education, Rhodes University, South Africa

[*]Corresponding author: d.wilmot@ru.ac.za, https://orcid.org/0000-0001-8184-4624

How to cite this article: Naxweka, J., and Wilmot, D. (2019). Namibian teachers' perceptions and practices of teaching mapwork. *Journal of Geography Education in Africa* (JoGEA), 2: 1 - 13. https://doi.org/10.46622/jogea.v2i1.2479.

Abstract

This article addresses the problem of consistently poor learner performance in mapwork in secondary school geography in Namibia from the perspective of teachers. It presents the findings of a qualitative case study focused on understanding geography teachers' perceptions and pedagogical practices of mapwork. Data were generated through a questionnaire administered to thirty teachers in fifteen secondary schools in the Ohangwena Region of Northern Namibia, and interviews and classroom observations were done with a purposive sample of three teachers. The study draws on Shulman's ideas of teachers' pedagogical content knowledge (1986, 1987) to interpret what the three teachers say about the teaching of mapwork and how they teach it. The findings reveal that the teachers are conscientious but ill-equipped to teach mapwork. Their classroom practices focus on teaching discrete map skills and procedural knowledge with little if any, attention given to spatial conceptual understanding and application of knowledge to solve problems. The study provides insights that may be of value to teachers, teacher educators and Senior Education Officers in Namibia and other southern African contexts when addressing the problem of low learning outcomes in mapwork.

Keywords: mapwork, perceptions, pedagogical content knowledge, teaching practices, spatial thinking.

Introduction

In Namibia, poor learner performance in mapwork in the junior and secondary examinations is a persistent and unresolved issue (Namibia. Directorate of National Examinations and Assessment [DNEA] 2015, 2016, 2017). Examiners' reports provide detailed feedback on the difficulties learners demonstrate with little, if any, attention paid to teachers' perceptions and classroom practices of teaching mapwork. The research reported in this article responds to the need for empirical research that may help to address the problem. It presents the

findings of a small-scale exploratory study that generated insights for understanding how mapwork is taught from the perspective of three Namibian secondary school geography teachers. Our main contention is that teachers play a key role in enabling and supporting mapwork learning. However, if teachers are to play this role effectively, they need map and spatial conceptual understanding and pedagogical content knowledge.

Teaching Mapwork

Maps are sophisticated graphic representations that encode spatial information, using symbols together with numbers and words. They are an important tool for communicating spatial information (Bednarz, n.d; Amosun, 2016). Maps promote spatial understanding and visualization which are pre-requite for spatial thinking (Balboni, 2013). Maps are an essential tool that geographers use to organise and analyse spatial information (Bednarz, n.d). According to Bednarz (n.d.) "…learning to think geographically is learning to think spatially" (p. 2). Spatial thinking is defined as "the knowledge, skills, and habits of mind to use spatial concepts, maps and graphs, and processes of reasoning in order to organize and solve problems" (Bednarz, Achoson, & Bednarz, 2006, p. 398). Map conventions and properties are abstract and thus for some, difficult to understand. Concepts such as overlay, buffer, distortion, scale, distance, symbols, direction and projection, which are essential for basic map reading and interpretation, and spatial analysis, need to be explicitly taught (Oda, 2016).

Namibian school geography aims to equip learners with knowledge and understanding of "… the relationships and interaction of people and their environment in response to physical and human processes, as well as aspects of changing world, a sense of place and relative location on local, regional and global scale with emphasis on Namibia" (Namibia. Ministry of Education, Arts and Culture [MEAC], 2015, pp. 1-2). It emphasizes the need for learners to develop geographical skills including "… suitable techniques for observation, collecting, classifying, presenting, analysing and interpreting data, obtaining information from a variety of sources such as maps in a variety of scales …" (Namibia. MEAC, 2015, p. 2). The curriculum lists map concepts, including, for example, contours/relief, position, perspective, map projections, interpolation, direction, bearing, distance, scale, inter-visibility, gradient and coordinates that must be taught in each grade, however, little attention is given to the application of these skills to solve problems (Namibia. MEAC, 2015). Furthermore, it acknowledges the need for interpreting human and physical aspects represented on maps and landforms on contour maps, but no guidance is provided on how to teach a spatial concept and spatial thinking using maps.

A review of international literature reveals that despite spatial thinking being viewed as "…pervasive, significant, and powerful, it is under-recognised, under-appreciated, and therefore under-instructed" (Larangeira & van der Merwe, 2016, p. 120). Bednarz (n.d.) contends that if learning to think geographically involves learning to think spatially and being able to interpret difficult information found on maps, geography teachers should also be able to read and interpret maps. Spatial thinking and visual literacy should be promoted explicitly in the subject curriculum. There is very little evidence of this in the Namibian geography curriculum.

Larangeira and van der Merwe (2016) argue that map literacy is an essential skill for interpreting difficult information presented visually in maps. It is an essential competence that cannot be neglected in the development of a geographer. To develop map literacy – the ability to read and interpret information on a map – teachers need to understand maps as a form of communication and allow students to become fluent in the language of maps (Bednarz et al., 2006, p. 402). Bednarz et al. (2006) explain that "… teaching *about* maps means providing students with the skills and understandings required to read, interpret and produce maps" (p. 399). It means using maps "… to help students learn key [map] concepts and relationships" (Bednarz et al., 2006, p. 399). On the other hand, teaching *with* maps allows students to learn and think *through* maps, (that is to think spatially) in various reasoning and problem-solving activities in both the classroom and real-world (Bednarz et al., 2006, p. 399). Teaching should take into account the difficulties students experience when learning about maps and spatial thinking (ibid., p. 402).

Bednarz (n.d.) argues that students should be taught to "think spatially to become fluent with spatial concepts, to think in terms of patterns in space (where), and to consider the processes that produced those patterns (how and why there)" (p. 2). Map literacy requires conceptual knowledge of the object/phenomenon represented in a map as well as spatial perceptual skills and an understanding of spatial concepts (Wilmot, 2002). Furthermore, the acquisition of spatial knowledge is dependent on spatial perception skills and spatial conceptual understanding. Spatial literacy is seen as an ability to recognise objects and features, and an ability, through cognition, to interpret and make sense of the object/feature, spatial relationships and make spatial inferences. Spatial literacy can be enhanced through the explicit teaching of spatial perceptual and conceptual skills from a young age (ibid.). It follows that teachers need to understand the spatial information and concepts that maps communicate and the conventions they use for doing so. Learners need to understand these concepts and the skills for calculating, measuring and reading spatial information encoded in a map and then be able to apply this knowledge to make sense of spatial processes, relationships and patterns in the natural environment (for example, calculate the gradient to understand slope type); and between the physical and human environment (for example how gradient affects transport and settlement).

The need for developing critical map literacy is acknowledged in the literature. For example, Bednarz et al. (2006) stress that, just as texts are written by individuals with different viewpoints, which can be read and interpreted differently for different purposes, maps too, are not just objects that represent reality; maps are socially constructed and are subjected to critical analysis. Bednarz et al. (2006) call for "an increase in levels of carto-literacy" that "… must include explicit instruction about how to interrogate a map — to consider the conditions under which it was produced, the viewpoint it portrays and the messages it conveys" (p. 404). Teaching should thus develop "students' critical awareness and scepticism about maps as well other graphics and images" (Bednarz et al., 2006, p. 404).

Despite the important role maps play in developing spatial thinking, the teaching and learning of mapwork is an ongoing challenge (Bednarz, Acheson & Bednarz, 2006; Larangeira & van der Merwe, 2016). In a South African study, Larangeira and van der Merwe (2016) found that the student teachers

eISSN: 2788-9114

who had trouble with map literacy were not taught map skills systemically at school. Very little research has been done on mapwork teaching and learning in Namibian school geography. Bock's study, conducted with student teachers at the University of Namibia, focused on the problems that student teachers experienced when reading and interpreting spatial information about landforms on 1:50 000 topographic maps (Bock, 2003). It found that the student teachers struggled with basic mathematic calculations, experienced problems with reading and interpreting maps and could not identify slopes and landforms on contour maps.

Studies done in Europe found that the difficulties encountered by students when reading and interpreting topographical maps may be attributed to teachers' inability to properly handle components of teaching mapwork skills (Reinfried, 2001). According to Bednarz et al. (2006) when teaching mapwork, teachers tend to teach map skills by focusing on the content of the map. As a result, too often, learners can give an account of the map but lack the ability to interpret the content and the geographic impacts illustrated by maps (ibid.). A similar finding emerged in McCall's (2011) study, with mapwork teaching focusing on "teaching factual details without requiring students to understand map and spatial concepts such as why places are located where they are, or reasons for their physical and human characteristics" (p.133). The focus was on memorization of facts rather than on helping students to think critically and learning with understanding (ibid.). According to Larangeira and van der Merwe (2016) "if students are rote taught and not encouraged to apply map skills, then their spatial cognition with regards to map literacy is impeded" (p. 134).

In the broader African context, a Nigerian study found that geography teachers do not possess the competency needed for teaching mapwork and this contributes to poor learner performance (Ezeudu & Utazi, 2014). Another Nigerian study found that concepts learners find difficult in mapwork are the same as those that teachers find difficult. This includes, for example, gradient, inter-visibility, latitude and longitude (Amosun, 2016). The research found that inappropriate teaching methods may be a contributing factor to poor performance in mapwork. The study also found that teachers are scared, and often avoid teaching mapwork because it is sophisticated and requires abstract thinking and mathematical skills (Amosun, 2016).

Teaching mapwork in Namibia

The research described in this article was focused on generating insights for understanding how mapwork is taught in Namibian secondary geography. It drew on Shulman's (1986, 1987) ideas of teacher knowledge, particularly Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) to interpret what emerged in the data. According to Shulman (1986), CK is knowledge and understanding of the concepts of the discipline. PCK, on the other hand, involves the blending of content and pedagogy into an understanding of how particular content is organised, represented and adapted to the diverse interests and abilities of the learners (Shulman, 1986).

The importance of PCK is acknowledged in the geography education literature (see for example Brooks, 2010; Harte & Reitano, 2015; Larangeira & van der Merwe, 2016). Jo and Bednarz (2014) explain how PCK in mapwork refers to a teacher's proficiency to present geographic concepts through a variety of maps to promote students' spatial thinking skills. According to them, teachers

with good PCK can include the bigger ideas of maps and their properties such as space, time, overlay, scale, distance, and location into a variety of teaching practices as well as in their lesson planning and assessment strategies (Jo & Bednarz 2014, p.302). Similarly, Reitano and Harte (2016) say that teachers with such PCK can use "multiple ways of analogies, illustrations, explanations, metaphor to present ideas to learners in a manner that combine the knowledge and of the content and pedagogy to learners …" (p. 281).

Another aspect of a geography teacher's PCK is an ability to recognise and build on learners' experiences and mental constructs and find ways of linking these to new ideas being taught (Lane, 2009). Balboni (2013) maintains that the best strategy a teacher can use is to "build on" what the learners already know. Balboni (2013) notes the importance of teachers being aware that children have been decoding and trying to make sense of their worlds since infancy. Good teaching recognises and builds on the knowledge and experiences of the learners. This is a key premise of constructivist epistemology which underpins Learner-Centred Pedagogy (LCP), the approach adopted by Namibian education policy.

LCP is strongly advocated in the international literature (see, for example, IGU/CGE, 2007). Recent international literature asserts that geography content should be linked to learner-centred approaches and it should build on and link learners' lived experiences to the geographical knowledge being learned (UNESCO, 2017). Opportunities should be provided for learners to construct knowledge, and think critically and creatively through active participation. Geography teachers need to "adopt a pedagogy that do[es] not only teach procedural knowledge, but which also includes tasks that enable learners to identify a geographical issue, interpret and create maps, work with methodologies to gather information and be able to compare the information they have collected" (UNESCO, 2017, p. 111). It cautions that "subject-centred and learner-centred approaches must be considered together and not as opposing poles" (UNESCO, 2017, p. 114).

The Namibian secondary school geography curriculum adopts LCP underpinned by constructivist epistemology which views learners as active participants in knowledge construction and sense-making. It calls for "…a high degree of learner participation, contribution and production … is based on a democratic pedagogy, a practice that promotes learning through understanding" (Namibia. MEAC, 2015, p. 5). Learning should include group work, pair work, individual and whole class work and it should promote cooperative and collaborative learning (Namibia. MEAC, 2015). LCP embraces different teaching and learning methods all of which should enable learners to participate actively in knowledge construction. These include: fieldwork and experiential learning, project-based and practical work; teacher talk (as opposed to teacher tell); enquiry, debates, games and simulations, questioning methods.

The theoretical perspectives presented above were used as lenses for viewing and interpreting what emerged in the research described in this article.

Research Method

Guided by the research goal, namely to generate insights for understanding teachers' perceptions and practices of teaching mapwork, a qualitative interpretive orientation was adopted. The research questions were as follows:

eISSN: 2788-9114

What are Namibian geography teachers' perceptions of teaching mapwork in secondary school (Grade 8 to 12)?

How do Namibian teachers teach mapwork in secondary school geography?

What lessons can be learned from the teachers' pedagogical practices that may be used to strengthen and enhance mapwork teaching?

Data were gathered through a questionnaire administered to 30 teachers in 15 schools offering geography at the secondary level (Grades 8 to 10 and/or Grade 8 to 12) in the Ohangwena Region of northern Namibia. Twenty-two teachers completed the questionnaire which consisted of closed-ended questions focused on general biographical information and open-ended questions on their perceptions and experiences of teaching mapwork. The questionnaires were analysed and emergent patterns and trends identified. Guided by what emerged, a sample of three teachers from three different schools was selected for semi-structured interviews to probe their questionnaire responses and ask follow-up questions. This was followed by classroom observations.

The teachers were fully informed about the research goals. Pseudonyms were used to ensure anonymity. Participation was voluntary and the teachers were given the freedom to withdraw at any stage of the study. Ethical clearance was obtained from the University's Ethics Research Committee.

The three teachers who had provided the most detailed responses were chosen, based on the assumption that they might represent best practice. One teacher (the most experienced) taught Grade 8 to10; the other two taught Grade 10 to 12. The interviews were audio-recorded, transcribed and member-checked by the teachers. The transcripts were analysed and emergent themes identified.

An observation schedule was used to observe each teacher teach two lessons to one class (Ms Nailonga [G10: Map symbols, scale and distance)], Mr Haitange [G11: Contours and grid references], and Ms Munageni [G12: Bearing and scale])[1]. The lessons were audio- and video recorded. This helped with capturing the teachers' body language and their verbal interactions with the learners. Open coding (Cohen, Manion, & Morrison, 2011) was used to identify emergent themes. Key findings of the interviews and observations are discussed in the next section.

Teachers' perceptions

In the semi-structured interviews, the three teachers acknowledged that mapwork is important and interesting but did not offer reasons to support their views. None spoke about the importance of maps as tools for visualising and communicating spatial information or how maps develop spatial thinking (an ability to read and interpret spatial information and interrelationships) and how this can be applied to address problems in the real world. They said they felt confident and enjoyed teaching mapwork. Ms Nailanga commented that this is "*... because there is a lot of practical work, for example, measuring, converting contour lines into landforms and so on.*"

There was general agreement on the challenges and difficulties they experience when teaching mapwork. The teachers

[1] Names have been changed

mentioned learners' lack of basic mathematical proficiency and ability to carry out simple calculations as well as a shortage of equipment and teaching materials including textbooks, charts, posters and maps. For example, the same maps are used over and over again for tests, practical activities and even for examinations. The use of non-contextual South African topographical maps in the examinations was identified as another challenge. "*... we are Namibians, but the maps we are using for our examinations especially in Grade 11 and 12 are from South Africa"* (Ms Munageni).

In response to a question about teacher motivation and creativity, the teachers indicated that the shortage of resources limits their creativity. Time was another constraining factor with teachers having to rush to cover the syllabus before the examinations. They were discouraged by the time learners took to grasp the concepts being taught. For example, Ms Munageni commented that mapwork is *"...quite challenging especially when it comes to learners because ... they have that negative attitude and they think it is tough and hard for them to understand and pass it."* The teachers also said that they felt demotivated by poor learner performance.

Two teachers maintained that the syllabus was useful but the objectives were not clear. They used textbooks, teachers' guides and colleagues to assist with their preparation. This is evident in the following comment from Ms Munageni:

I used to take the syllabus objective and present it to the learners in the classroom so they know what they are expected to…. Yes, the syllabus is useful [because] that is where the examination questions are driven from.

The teachers described an approach to learning that was similar. Typically, it consisted of starting a lesson with questions to elicit the learners' prior knowledge, explaining the lesson content and concluding with an activity. Ms Munageni elaborated:

First I like to get the learners' prior knowledge on that specific topic if it is new or based on a topographic map. I first ask them how they understand or give me their knowledge because some of the things they covered already from the previous grade. Then from there I can give them more information and ask questions after I give them a class activity based on the lesson.

Ms Nailonga explained that:

I don't know where to start, since I have different topics in mapwork. If I have to teach how to interpret maps ... I have to ask them some general questions for example, what is a map? After giving their answers I might give a map, where they have to identify different features they see in that map… Then we look at the keys that are shown on the map and I explain to them which keys are helping us to read the map. After these discussion[s] I have to explain how the map can be interpreted and how the features in the map can be asked in the exam.

In response to the question of what teaching methods were used for teaching mapwork, teacher tell, group and practical work were mentioned. For instance, Ms Munageni said she uses*"…a lecture method whereby I give more information to the learners, although I have to ask them their pre-knowledge first… and I also use group work whereby I give each group a task to present to others in front."* Ms Nailanga said her approach was "learner-centred" and consisted of a questioning and answering method, demonstration and practical activities.

eISSN: 2788-9114

According to her *"... mapwork needs practice instead of just talking."* She explained how she took the learners outside to identify slope types before comparing how they were represented on a contour map. Practical activities involved the learners drawing a contour sketch of a conical hill, a valley and a spur. Mr Haitange also indicated that he sometimes takes learners into the field to identify different landforms and slopes and measure distance. In contrast, Ms Munageni indicated that she never took learners into the field because fieldwork and enquiry methods are only applicable to research skills. Her practical activities involved getting learners to build cut-out cardboard models showing the contours of different landforms.

Mixed responses were received to the question of whether mapwork was taught as a separate topic or integrated when teaching other themes in the syllabus, and there were contradictions between what was said in the questionnaire and interviews. For example, in the questionnaire, Mr Haitange indicated that he integrates mapwork with settlement, population and climatology. However, when probed during the interview he said he teaches mapwork separately after teaching other topics. Ms Munageni and Mr Haitange said that integrating mapwork confused learners because many were not familiar with the features in the map. None of the teachers mentioned using maps to illustrate or promote an understanding of the relationship between human activities and the physical environment.

Teachers' classroom practices

The classroom observations showed a predominance of teacher-centered approaches and teacher tell methods. The six lessons followed a similar sequence when a map skill was taught: typically, the lesson started with the teacher asking questions to elicit learners' prior knowledge, the content was then explained and instructions were interspersed with questions requiring short answers, followed by an activity towards the end of the lesson. The focus of the lessons was on teaching – through direct instruction – learners how to do something with no attention paid to applying the skill when using a map. The teachers did almost all the talking and learners only spoke when answering a question or responding to a teacher's request. This is illustrated in the following extract from Ms Nailongo's Grade 10 lesson on map symbols in which she asked learners to recall the basic features of maps and wrote their responses (scale, key, title, direction, relief, position) on the chalkboard. A few minutes were spent describing each without referring to an actual map. She told the learners that maps use symbols to communicate information but did not explain what this entails or what learners need to know and understand to read and interpret maps.

Ms Nailonga: ... Those are some of the basic features that you may find on all of the maps. There should be a scale. Imagine a map of your country, a map of your classroom, a map of the world to fit on a small piece of paper is because it is reduced to scale. ... all the maps, they are reduced in order to fit on the paper. We also have the key. This is symbols because in the map we normally talk about the language of symbols where they are indicating what the symbols represent on that map. We also have a title - this is just a topic based on what the map is all about. And we have the direction, so the direction usually in most of the maps you may find an arrow, that an arrow usually has N. Do you see it?

Learners: Yes [in unison]

This approach is similar to the "… traditional instruction method where the teacher talks, illustrates, explains and answers questions" (Golightly, 2018, p. 450). A similar approach was used by Ms Munageni when teaching Grade 12:

Ms Munageni: So, if I may take you back to what we covered last time on mapwork, we learned that in a topographical map there are two types of features, isn't [it]?

Learners: Yes,

Ms Munageni: Who can name those features for us? Yes, Panduleni?

Panduleni: We have natural features and man-made features

Ms Munageni: Yes, we have natural features and man-made features, so man-made features are features that are constructed by human beings and we also have physical features or natural features, features from nature. So, some of the natural features on the topographical map can be presented using contour lines. In some cases, you can be asked to discuss the relief features of the specific place and then you must make use of the contour lines to help you identify those features and that is what we are going to talk about today,

Ms Munageni then asked the learners to define contours.

Ms Munageni: ... but before we look at those landforms we have to remind ourselves what are contour lines? What are contour lines? Who can help us to define that? Tuli?

Tuli: Lines on the map joining points on the map with equal height.

Ms Munageni: Contour lines are lines on the map joining places with equal height. Meaning that we have a line that is joining different places with equal height. Contour lines have some features — who can give me features of the contour lines? Characteristics of contour lines. Who can help with that? Or rules for contour lines, contour lines have rules? What are those rules?

Learners: Contour lines never touch.

Ms Munageni: So, they never touch, is it touch?

Learners: *Cross*

Ms Munageni: Contour lines never cross each other. So, they never cross each other, however, they can touch each other at some points.

Ms Munageni asked learners to identify the different landforms illustrated by contour lines.

Ms Munageni: List all the landforms that we can remember that are formed by contour lines.

We have a lot of them probably ten. Can you list that you know? Panduleni?

Panduleni: I know a spur

Ms Munageni: We have a spur. Hafo?

Hafo: A valley

This teaching was theoretical and lacked practical application to a map. The learners were being asked to recall what they knew about map symbols rather than being tasked with reading and interpreting what they depict on an actual map.

In contrast, Mr Haitange's lessons on measuring distances and converting to scale involved the Grade 11s working with 1:50

000 topographical maps. After a lengthy explanation of scale and the metric system and demonstrating the steps to be followed when measuring straight and curved surfaces, he tasked the learners with measuring a distance on the map and convert to scale using their rulers. No opportunities were provided for learners "to critically examine the processes of knowledge construction" (Golightly, 2018, p. 438). Instead the teacher-tell/direct instruction method focused on telling the learners how to measure distance and convert to scale with procedural knowledge of how to do a map skill foregrounded at the expense of conceptual knowledge and application.

Questions and questioning

The observations showed that while all three teachers started their lessons with questions to elicit what the learners knew, they did not expand the learners' knowledge or understanding or link it to the current concept being introduced. Throughout the lessons, the teachers asked the learners factual questions which required simple, often one-word responses. There was no evidence of questions being used to elicit learners' misconceptions or explain in their own words the skill, procedure or content being taught. The teachers asked all the questions and learners were not encouraged to ask their own questions for clarification or other purposes.

For the most, rote learning through memorization and the recalling of facts was evident in the way the teachers recited the content to the learners over and over again. Learners rehearsed the skill being taught by repeating what they were being taught. When learners were able to repeat what they had been taught, the teacher assumed that learning had taken place and started explaining the next step. In this sense, drill and memorization were foregrounded. Larangeira and van der Merwe (2016) caution that "if students are rote-taught and not encouraged to apply map skills, then their spatial cognition with regards to map literacy is impeded" (p. 316). In all three cases, learners were not only deprived of applying their mapwork skills, but they were also not encouraged to think critically and creatively about the topic being taught. The learners were also asked if they were paying attention, if they had all the materials needed for the lesson, and if they were following. The teacher asked randomly if the learners were following and if learners gave an affirmative answer (yes), it served as encouragement for the teacher to continue explaining without checking whether the learners were actually following or understanding what was being taught. From talking to and observing the three teachers, there was little evidence that suggests that they understand the importance of questioning in diagnosing misconceptions, and supporting and extending learning. We are of the view that teachers' questioning skills need to be strengthened so that they are aware of 'what' questions to ask and 'how' to ask them in order to develop learners' spatial knowledge and high-order thinking skills.

An emphasis on maps skills

Our interviews and observations provide evidence that the teaching of mapwork is closely aligned to the content listed in the curriculum. Although the teachers in their interviews claimed to promote map reading, interpretation and analysis of geographical information, this was not evident in their teaching. From the lesson observation, it was clear that teachers focused on teaching mapwork skills without any application or problem-solving. In all three cases, mapwork was taught in an abstract manner with little

application to an actual map or lived experiences of the learners. Bednarz et al. (2006) noted that when teaching mapwork, teachers tend to teach map skills by focusing on the content of the map. As a result, all too often, learners can give an account of the map but lack the ability to interpret the content and the geographic impact illustrated by maps (Bednarz et al., 2006).

In the lessons, we observed we did not find evidence of maps being used to develop learners' understanding of how the human and natural environment inter-relate. In the interviews, teachers said that they integrate mapwork with other aspects of geography such as settlement geography, climatology and population geography. This was not observed in practice. The teachers taught map skills (how to do calculations, measure and find places on map) and there was no evidence of them using maps to develop spatial thinking. There was little, if any, evidence of the curriculum as intended being enacted in practice. This may account for why map skills are taught in isolation with little, if any, linking to content knowledge (for example, geomorphology).

We contend that the actions and focus of the teachers on the procedures and skills listed in the curriculum, and textbooks, is in part the fault of the curriculum itself. Our analysis of the Namibian geography curriculum (Namibia. MEAC, 2015) revealed some real weaknesses. The same content is taught at all grade levels from 8 to12 with no progression or extension of the curriculum content as the grade levels go higher. The focus of all but one item, viz. "interpret maps reflecting human and physical aspects", while necessary, favours low-level factual, procedural knowledge, and drawing and measuring skills. We argue for progression in the secondary school geography curriculum (mapwork content) as the grade levels proceed, and beyond largely only emphasizing and teaching the necessary map skills and procedural knowledge.

The mapwork curriculum should also include the requirement to teach the application of map skills to solve problems and spatial concepts at the higher grades. It also needs to elaborate on what is expected under the item *interpret and use maps reflecting human and physical aspects* how spatial literacy and critical spatial literacy can be developed and maps used as maps tools for engaging with the environmental issues included in the curriculum (Namibia. Ministry of Education, 2010). Learning support materials

Shulman (1986, 1987) describes two elements of PCK that impact teaching: the first is "representation", which is the ability of the teacher to transform the content knowledge into forms that are pedagogically powerful for the learners to understand. The second is described as "teachers' understanding of what makes learning of specific topics easy or difficult" (Shulman, 1986, p. 9). This implies that teachers need to know their subject content and appropriate methods of teaching it and that this would include selecting and using LTSMs that enable learning and make it stimulating and enjoyable. This study reveals little evidence of this happening. Rather, the teachers relied on their hand-drawn sketch maps for teaching concepts such as contours, scale and distance, direction and bearing. It meant that in the absence of actual maps, map skills were taught in an abstract, procedural and arguably boring manner with learners having to imagine what reduction looked like and so forth. The absence of maps meant that there were no opportunities for learners to apply their knowledge to solve a problem (for example, measuring and calculating how far it was from one point to another in the real world using a map). The teachers did not

eISSN: 2788-9114

seem to be aware of the relevance and importance of working with actual maps and they did not use mapwork specific textbooks to enhance and extend learning.

Conclusion

This article has described a small scale study of teachers' perceptions and practices of teaching mapwork at one level of the Namibian school system (Grades 10 to12). We acknowledge that school settings and teachers' practices and experiences differ across different regions of Namibia and thus make no claim to generalising the findings to the wider community (of secondary school geography teachers in Namibia) to which the three teachers belong.

We conclude that the geography teachers we interviewed and observed are committed and conscientious professionals who adhere closely to teaching the mapwork content prescribed in the curriculum. Their teaching, however, foregrounds skills at the expense of conceptual understanding and application to real-world contexts and problem-solving. We contend that teachers need to be supported in deepening their curriculum and PCK through teacher professional development programmes that are theoretically informed. The issue of progression and underspecification of spatial conceptual knowledge in the mapwork component of the Namibian school geography curriculum needs to be addressed.

We hope that the insights gleaned from this study may help to stimulate discussion and debate amongst geography teachers, teacher educators, curriculum developers and Senior Education Officers (SOE) in Namibian and other southern African contexts.

References

Amosun, P. A. (2016). Why Nigerian geography teachers scarcely and scantly teach map reading and why students are scared of it. *African Education Research Journal, 4*(2), 42-48.

Balboni, B. S. (2013). Making maps and atlases an everyday tool in school: *A guide to using my first atlas of Belize, atlas of Belize, and atlas of Belize and the world.* Retrieved February 27, 2017 from http://dx.doi.org/10.1016/j.cosust

Bednarz, S. W. (n.d.). Maps and spatial thinking skills in the AP human geography classroom. Retrieved March 20, 2017, from http://apcentral.collegeboard.com/print/html

Bednarz, S. W., Acheson, G. & Bednarz, R. S. (2006). Maps and map learning in social studies. *Social Education, 70*(7), 398-432.

Bock, L. J. (2003). Problems student teachers face in communicating spatial information about landforms on 1:50 000 topographical maps. Unpublished Master's thesis, Grahamstown, Rhodes University.

Brooks, C. (2010). Why geography teachers' subject expertise matters. *Geography, 95*(3), 143-146.

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.) London: Routledge.

Ezeundu, S. A., & Utazi, O. J. (2014). Competency gaps among geography teachers in the teaching of geography mapwork in secondary schools in Kogi State. *Journal of Education and Practice, 5*(25), 41-48.

Goligthly, A. (2018). Teaching and learning styles and strategies in geography education. In E. S. Van Eeden & P. Warnich (Eds.), *Teaching and learning History and geography in the South African classroom* (pp. 437-457). Pretoria: Van Schaik.

Harte, W., & Reitano, P. (2015). Pre-service geography teachers' confidence in geographical subject matter knowledge and teaching geographical skills. *International Research in Geographical and Environmental Education, 23*(3), 223-236, doi: 10. 1080/10382046.2015.1034458.

Jo, I., & Bednarz, S. W. (2014). Developing pre-service teachers' pedagogical content knowledge for teaching spatial thinking through geography. *Journal of Geography in Higher Education, 38*(2), 301-313, doi: 10.1080/03098265.2014.911828.

Lane, R. (2009). Articulating the pedagogical content knowledge of accomplished geography teachers. *Geography Education,* 22, 40-50.

Larangeira, R., & van der Merwe, C. D. (2016). Map literacy and spatial cognition challenges for student geography teachers in South Africa. *Perspectives in Education, 34*(2), 120- 138. McCall, A. L. (2011). Promoting critical thinking and inquiry through maps in elementary classrooms. *The Social Studies*, 102, 132-138, doi: 10.1080/00377996.2010.538759.

Namibia. Ministry of Education Arts and Culture. (2015). *Report on the Examinations: Namibia Senior Secondary Certificate Ordinary level [NSSCO].* Windhoek: DNEA.
Namibia. Ministry of Education Arts and Culture. (2016). Report on the Examinations: *Senior Secondary Certificate High level [NSSCH].* Windhoek: DNEA.

Namibia. Ministry of Education Arts and Culture. (2017). *Report on the Examinations: Namibia Senior Secondary Certificate Ordinary level [NSSCO]*. Windhoek: DNEA.

Namibia. Ministry of Education, Arts and Culture. (2015). *Junior Secondary Phase geography syllabus grade 8-9*. Okahandja: NIED.
Namibia. Ministry of Education. (2010). *Senior Secondary Phase geography syllabus grade 1112.* Okahandja: NIED.
Oda, K. (2016). Concept maps as a tool to analyse college students' knowledge of geospatial concept. *Review of International Geographical Education Online*, *6*(2), 177-199. Retrieved May 26, 2017 from http://www.rigeo.org
Reinfried, S. (2001). Curricular change in the teaching of geography in Swiss upper secondary schools: An attempt to develop skills for lifelong learning, *Journal of geography, 100*(6), 251-260, doi: 10.1080/00221340108978452.
Reitano, P., & Harte, W. (2016). Geography pre-service teachers' pedagogical content knowledge. *An International Journal*, *11*(4), 279-291, doi:
10.1080/1554480X.2016.1195740.
Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Research, 15*(2), 4-14.
Shulman, L. S. (1987). Knowledge and teaching: foundation of the new reform. *Education Research, 57*(1), 1-21, doi: 0017-8055/87/0200-0001.
UNESCO, (2017). Textbooks for sustainable development: *A guide to embedding*. New Delhi: UNESCO MGIEP.
Wilmot, D. (2002). Investigating children's graphic skills: A South African case study, *International Research in Geography and Environmental Education, 11*(4), 325340, http://dx.doi:
org/10.1080/10382040208667500.