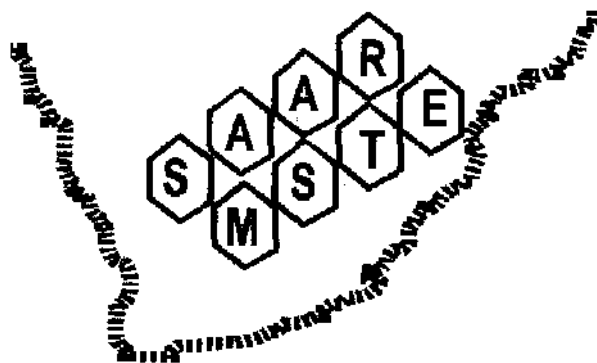


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Learner-Centred Approaches In Math Classes In Khomas Region: Namibian Cases

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Abstract

This paper reports on learner-centred approaches used by three mathematics teachers in Khomas region in Namibia. Although learner-centred teaching is the officially adopted and promoted mode of transacting the curriculum in Namibia, many serving teachers appear to have problems in implementing learner-centred education. Verbatim transcribed video lessons were used to highlight signs of learner-centred approaches in three mathematics classrooms at senior secondary level. Teachers' lessons show some traces of learner-centred approaches.

Introduction

The educational reform (1986-1995) in Namibia proposed pedagogical changes in the classrooms, namely the introduction of learner-centred approaches. To advocate and promote this new reform, several projects such as, the Integrated Teacher Training Programme (ITTP), the In-Service Training and Assistance to Namibia Teachers (INSTANT) and the Basic Education Teacher Diploma (BETD) were introduced respectively. In 1993, Namibia embraced the idea of Learner Centred Education (MEC, 1993; Angula and Grant-Lewis, 1997) as the framework for curriculum and teaching at all levels of primary and secondary schooling. This major innovation was an attempt to move away from the subject-centred curriculum and teacher-centred teaching that had characterized education during the colonial period (Tabachnick, 1998). Thus, the 'new' teaching method (learner-centred) would address the inequalities of the past, ensure a quality and democratic education and provide equity among the Namibian learners (MEC, 1993). However, Namibia has not fully recovered from the colonial malpractices, especially in mathematics education. A Task Force on 'Improving Mathematics in Namibia' (23-27 September, 2002) reports that irrespective of "projects, papers written, and research carried out in mathematics and mathematics education... there has not been a great deal of improvement resulting from these efforts; learners still under-achieved in mathematics" (Namibia Human Resource Development Programme (NHRDP, 2002: 3). This paper therefore examines learner-centred practices in mathematics classrooms by addressing the following research questions:

1. How do mathematics teachers practice learner-centred approaches at secondary schools in the Khomas region?
2. What perceptions do secondary school mathematics teachers have on learner-centred education in Namibia?

Literature review

The term learner-centred education (LCE) is a very old concept in the education setting. Its origin could be traced back to the work of some of the well-known philosophers and educators such as Confucius, Socrates, Jean-Jacques Rousseau, Francis Parker, Pestalozzi, just to mention but a few (Cuban, 1993; Henson, 2003). According to Henson (2003), the history of LCE stands on two feet. It has one foot in the philosophy and the other in the psychology. Henson speculates that a Chinese philosopher Confucius and a Greek philosopher Socrates (around 5th and 4th century BC respectively) were the earliest individual teachers to have intense and direct effect on learner-centred education. Later on, around the 16th century, Johann Pestalozzi was influenced by Rousseau's writings and decides to open a school with a learner-

centred curriculum in Switzerland (Henson, 2003). Henson further writes that, during that time Fredrick Froebel (in Germany) uses the learner-centred, child-centred, and experience-based ideas to develop the world's first kindergartern. Centuries later, with the influence of diverse notions from various educators (such as John Locke's *tabula-rasa*, Francis Bacon's scientific method, Immanuel Kant's pragmatism and others) John Dewey at the famous School of Education, University of Chicago, idealised the concept of learner-centred education to "embrace the idea that education should be both problem-based and fun"(Henson, 2003:3).

During the 20th century, several psychological developments such as perceptual psychology, constructivism, and disposition (among others) influenced the development of learner-centred education (Henson, 2003). Learner-centred education is also said to rely more on the theory of social constructivism, because social constructivism takes into account the social nature of the learning environment as a collaborative atmosphere between teachers and learners (Dougiamas, 1998; Murphy, 1997; Roesler, 2002).

Roesler (2002) further mentions that, in a social constructivist classroom, learners play an active role because they are able to construct their own meanings, rather than just memorising and reciting the 'correct' answers. Specifically, Roesler highlights some elements that would represent a typical constructivist mathematics classroom as follows; exploration of real-world phenomena, possibilities, and problems; recognition for the role of patterning in understanding mathematical functions and application of mathematics structures; appreciation of the objectivity and utility of mathematics, as well as its fallibility and culture-boundedness; emphasis on exploration and abundant use of manipulatives.

In general, the term learner-centred education could therefore be defined as a concept that embraces terms such as, active learning, exploration, self-responsibility, learners' prior knowledge and skills and construction of knowledge rather than passive participation of students (Edmund & Stephens, 2000; McCombs & Whisler, 1997; Thompson et al, 2003; Walczyk & Ramsey, 2003; Woelfel, 2004). The Ministry of Basic Education and Culture (MBEC) in Namibia, specifically defines the term learner-centred education as:

An approach to teaching and learning that comes directly from the National Goals of *equity* (fairness) and *democracy* (participation). It is an approach that means that teachers put the needs of the learner at the centre of what they do in the classroom, rather than the learner being made to fit whatever needs the teacher has decided upon... learning must begin by using or finding out the learners' existing knowledge, skills and understanding of the topic... Then teachers develop more activities that build on and extend the learners' knowledge (MBEC, 1999:2).

3. The importance of teaching and learning mathematics has been recognized by educators for a long time. Several authors (Goulding, 1997; Nickson, 2000; Selinger, 1994) stress the importance of social, affective and cognitive domains in the teaching and learning of mathematics. For example, Goulding (1997: 144) states "if learning is influenced by social, affective, and cognitive dimensions then teachers clearly have to attend to all these factors in the classroom in creating learning opportunities for pupils".

Methods

Three mathematics classrooms were conveniently chosen at secondary schools in the Khomas region in Namibia. Each class was observed for a period of two weeks. A video camera was used to record a total number of 22 lessons. The lessons were transcribed verbatim and three teachers were interviewed at the end of each classroom observation. Data were analysed and seven themes emanating from the observations were used to highlight learner-centred characteristics. Excerpts that show some evidence of learner-centred practices were used to illustrate the nature of classroom practice present in those classes.

Preliminary findings

Teachers' practices of learner-centred approaches

Seven themes were used to describe and interpret the learning activities and experiences in three mathematics classrooms (A, B and C). Table 1 below presents a description of the themes as well as the examples of the indicators that relate to the themes.

Table 1: Themes and indicators for classroom interactions and practices

Themes	Examples of indicators
Learners involvement in the lesson or topic/task	Communication (verbal/ non-verbal); written work (class work, homework etc).
Questions asked at high level of cognitive understanding	Why, how, explain, (not what is..?)
Class activities or actions carried out by learners	Class work (oral or written work) in exercise books or chalkboard.
Reference to learners' previous experience	Teacher refers to work done in previous grades (10, 9, 8 etc.) or refers to what learners already now (background experience)
Reference to real-life experience	When teacher uses examples that are familiar to learners' background experience.
Connections to other subject areas	Refer to subjects such as Physical Science, Biology, Geography etc.
Connections to prior math knowledge	Basic mathematical knowledge e.g. rules & equations

1. Learners' involvement in the lesson or topic/task

This theme concentrates on episodes that describe learners' involvement in classroom discourse during lesson presentation. Instances of verbal communication between teacher and learners as well as between learners and learners were noted. Chorus answers by learners, affirmations and negatives utterances by either the learners or the teacher are part of this category. However, cases such as reprimands for late arrival in class or when the class discusses issues about soccer or politics are excluded in this category.

2. Questions asked at high level of cognitive understanding

Theme two illustrates the type of questions that were asked either by the teacher or the learners. Using Bloom's taxonomy of questioning technique (knowledge, comprehension, application, analysis, synthesis and evaluation level), questions at high level of cognitive understanding were selected and the ones at low level, namely recall type of questions were ignored. For example, questions such as *why, how, explain, what if...*, were taken into consideration.

3. Class activities or actions carried out by learners

This theme describes different types of class activities and actions the learners were involved in. It specifically concentrates on the work done in class the learners (individually or in groups). Written work on the chalkboard or in the exercise books; hands-on activities; and practical investigations are part of this theme. Activities such as sweeping the classroom or cleaning the chalkboard are excluded.

4. Reference to learners' previous experience

This category highlights instances where teachers use learners' previous experiences or background knowledge during teaching. However, in some cases the data do not explicitly reveal teachers' tendency to refer to learners' previous knowledge from earlier grades as the following extract illustrates:

Excerpt from classroom A Lesson 1 (Algebra)

Teacher A: As you already know from the previous grades ne, algebra.. It's about algebra, and the things that I gave you, is a summary of the things you have learned in grade 8 and 9. I'm just going through it quickly so that you can refresh and then

we are going to do some exercises to see if you can still remember, nee?....
 So, under the topic algebraic expression there are some things that you have learned and that you must remember. Because you are going to write in grade 12, you already know that we must write the things you already learned from grade 8 up to grade 12.

Excerpt from classroom C Lesson 1 (Factorization)

Teacher C: I'm sorry. (Teacher writes the answer: $(p + q)(a - b)$). The next one is the quadratic trinomial. You know what a trinomial is? **The word tri means?**

Girl (4): Three

Teacher C: **Three ne! Tricycle, when you were little you were driving tricycles. Those are bicycles with three wheels. So tri mean three that expression that has three terms. Now if you look at my expression (on the board), the $ax + bx + c$ that I write there. There are three terms. The first term contains a square.**

5. Reference to real-life experience

This category concentrates on episodes that describe teachers' reference to real-life experiences. For example, when teachers use examples that are familiar to learners' out-of class experience or when they do mathematical problems that relate to learners' daily familiarity.

6. Connections to other subject areas

Unlike theme five, this theme on the other hand presents examples of cases where teachers made references to other inter-disciplinary subject areas such as Physical Science, Biology, Geography and other science related subjects.

7. Connections to prior math knowledge

Theme seven illustrates instances where teachers expect learners to use prior mathematics knowledge in order to solve mathematics problems. For example, teachers anticipated learners to recall mathematics rules and equations they have learned in the previous grades. See the bold text in the excerpt below:

Excerpt from classroom B Lesson 8

Teacher B: **If y is the function written in this form, any function, y stands for any function that can be written in this form, then m is the gradient and the constant which is c is the $y -$ intercept. In our case, we have been given $y = 2x$ and we didn't ... the gradient and $y -$ intercept. **That's why I wrote this equation which is known world-wide. Ya, and that's why I asked you to compare these 2 equation.****

It is recognized that the three classrooms visited represent unique situations because teachers were teaching different topics (but using the same syllabus). The learners (as well as their teachers) are also unique people with individual differences. Vakalisa (2004:2) supports this notion of unique situations by stating that "...the teaching and learning relationships between teachers and learners are dynamic rather than static and predictable". Therefore, attempts were made to avoid making comparison of the findings among the three classrooms, but instead to focus on either common or unique issues as they arise in each classroom.

The findings also indicate that teachers are to a certain extent practising some learner-centred approaches and learners were to a certain degree engaged in the lessons through asking meaningful questions (at high level of cognitive understand). Table 2, 3 and 4 below provide the frequency counts of teacher-learner initiated conversations in the three classrooms:

Table 2: Learners' engagement in classroom A

Lessons	L1		L2		L3		L4		L5		L6		L7		L8		
T= teacher L= learner	Initiator		Initiator		Initiator		Initiator		Initiator		Initiator		Initiator		Initiator		
	T	L	T	L	T	L	T	L	T	L	T	L	T	L	T	L	
Terminator	T	5	7	1	3	5	3	7	7	4	11	7	13	4			
	L	12	16	8	7	6	4	11	13								
Total		12	5	16	7	9	3	7	5	6	3	4	7	11	7	13	4
		17	23	12	12	9	11	18	17								

Table 3: Learners' engagement in classroom B

Lessons	L1		L2		L3		L4		L5		L6		L7		L8		
T= teacher L= learner	Initiator		Initiator		Initiator		Initiator		Initiator		Initiator		Initiator		Initiator		
	T	L	T	L	T	L	T	L	T	L	T	L	T	L	T	L	
Terminator	T	14	2	1	28	8	4	3	17	15							
	L	8	1	3	14	1	5	11	5	1	11	7	7	1			
Total		8	15	3	2	16	29	5	8	11	4	5	4	11	18	7	16
		23	5	45	13	15	9	29	23								

Table 4: Learners' engagement in classroom C

Lessons	L1		L2		L3		L4		L5		L6	
T= teacher L= learner	Initiator		Initiator		Initiator		Initiator		Initiator		Initiator	
	T	L	T	L	T	L	T	L	T	L	T	L
Terminator	T	3	7	2	3	2	1	3	1	2		
	L	27	35	47	45	28	43					
Total		30	7	37	3	49	1	43	3	29	2	43
		37	40	50	46	31	43					

Interestingly enough, the conversation in classroom B was mostly dominated by learners asking meaningful questions as compared to their teacher. Therefore, it is of no surprise that learners in this classroom initiated most of the classroom discourse (see table 3). On the other hand, classroom C discourse was dominated by the teacher's questions that elicited learners' thinking skills. For example, in table 4 lesson 3, the ratio of teacher-learner initiated talk is 49:1. That is, the teacher ruled the conversation in this particular lesson. During classroom observations it was noticed that learners in classroom C were however too quiet compared to the behaviours of other learners in classroom A and B. The interview session with the teacher C of reveals interesting results as follow:

Interviewer: *Your learners were quiet most of the time. Is this how they usually behave?*

Teacher C: *Yes*

Interviewer: *They didn't make much noise. I visited other schools where learners made noise and screamed and do things like that while the teacher is in the class. But I noticed that with your learners they were quiet and very obedient. I don't know if I can put it that way?*

Teacher C: *Yes*

Interviewer: *Is that the way they would normally react or ...?*

Teacher C: *No, is not the way. But they are not a difficult class at all. The last few days I struggled to keep them quiet, to get them to get their attention all the time but it is not very bad. It's the incidence from the time you were recording when you are not there anymore. And the other thing is, they told me "Miss we are a bit stressed, when is the lady finish recording?"*

Interviewer: *Ok!*

Teacher C: *So, that's actually one of the reasons why they were quiet.*

Interviewer: *Wow, this is very interesting because in the other classes, the learners wanted to make noise and to, like they wanted to be heard (and get noticed).*

Teachers' perceptions on learner-centred education

During interview sessions, teachers have this to say about learner-centred education in Namibia: *I think it is usually a nice a nice...mmh if you look to the concept itself is a nice concept of the learner-centered because the learners are discovering things for themselves. And if they discover for themselves then they will understand it better. But as I said with those learners at our school they don't want to do something for themselves...they want the teachers to think for them. They don't want to discover for themselves... They (learners) wanted to get the things from m. (Teacher A).*

I think it, it is the exchange of ideas between the teacher and the learners. That, when you are teaching you should allow eye contact with the learners and try to give them (learners) time to ask you questions if they don't understand (Teacher B).

It is very difficult. The learner must be in the middle, the center is the middle, right? The middle of the discussion you know. It's about the learner. They are the ones that has (sic) to learn and they are the important one. The teacher mustn't be the important one. The learner is the one that's all about I think. Maybe it's wrong but that's my view (Teacher C).

Discussion

These preliminary findings indicate that although teachers have mixed feelings about the use of learner-centeredness, they do to some extent attempt to practice learner-centred approaches in their classrooms. Teachers endeavour to engage learners in active dialogue, namely asking questions that trigger learners' critical thinking, giving individual tasks during teaching, attempting to put lessons into context by using daily life experiences and using learners' prior mathematics knowledge. However, teachers express that learners are not serious enough in their studies and they want to be spoon-fed. It is hoped that further analysis of the results will help the researcher make appropriate conclusions.

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