[redacted]

Dr. H M KAPENDA

Some Developments in Research in Science and Mathematics in Sub-Saharan Africa: Access, Relevance, Learning, Curriculum Research

Edited by Lorna Holtman, Cyril Julie, Øyvind Mikalsen, David Mtetwa and Meshach Ogunniyi

AFRICAN

Contents

First published in 2008 by African Minds
4 Eccleston Place, Somerset West, South Africa
www.africanminds.co.za

ISBN: 978-1-920299-29-3

Produced by Compress.dsl
www.compressdsl.com <http://www.compressdsl.com>
Cover design by Paul-Erik Lillhølm Rosenbaum

1. Developing a Research Instrument for Learner-Centred Classroom Observations: A Namibian Experience

Hileni M. Kapenda, Ole E. Torkildsen, David Mtetwa and Cyril Julie

Abstract

Although most researchers prefer to adapt or modify existing instruments that relate to their field of interest, the exercise still remains overwhelming and cumbersome. But, occasionally, a need arises for creating a new instrument for a specific purpose. This chapter shows that the process of designing and constructing a research instrument can be challenging and frustrating. The chapter also focuses on some of the significant personal experiences of the lead author's struggle and long journey in the construction of a research instrument for her thesis on learner-centred education in Namibian schools. The main objective for the chapter is to provide some advice to the reader, and especially to an emerging researcher, about the challenges of designing a new research instrument. Considerations about how and why certain decisions have to be made at certain stages become important matters for discussion.

Introduction

In general, the term learner-centred education (LCE) embraces terms such as active learning, exploration, self-responsibility, consideration of learners' prior knowledge and skills, and construction of knowledge rather than passive participation of students (APA, 1997; MEC, 1993; Walczyk

and Ramsey, 2003). Most notably, McCombs and Whisler (1997: 9) defined the concept 'learner-centred' as:

> A perspective that couples a focus on individual learners (their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs) with a focus on learning (the best available knowledge about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning, and achievement for all learners).

According to various studies and reports on the education system in Namibia (specifically after independence in 1990), most teachers in Namibia are experiencing problems with the implementation of learner-centred approaches (Chaka, 1997; Shaalukeni, 2002; Shinyemba, 1999; Sibuku, 1997). Kamupingene (1998: 124) confirms this statement by reporting that, 'there is a lack of common understanding of learner-centered education in Namibia'. The MBEC (1999:15) acknowledges this by stating that, 'even though learner-centered education is a good idea, many teachers have difficulties using it'.

Now, imagine yourself as a novice researcher interested in understanding the implementation of learner-centred (LC) approaches. How would you best assess the application of LC approaches in the classroom? This chapter will endeavour to introduce the reader to some of the phases and challenges the primary author experienced in designing a research instrument for measuring the extent to which LC practices are present in Namibian mathematics classrooms.

Phases and challenges of designing an instrument

Most researchers use research instruments that they have either modified and/or adapted from other sources. One of the reasons for searching for existing sources is the fact that one does not necessarily want to re-invent the wheel. However, it is a truism that even if cognate instruments exist, they normally need tuning to fit the issue that is being addressed. As alluded to above, the study related to the instrument design discussed in this chapter necessitated the exploration of various research instruments that were used for studies that investigated issues on LCE, specifically in Namibian classrooms. Initially, instruments from Sibuku (1997), Shinyemba (1999) and Van Graan (1999) were revised and adapted. Some of the main

reasons for adapting the instruments are: (1) the three authors carried out their studies at primary and junior secondary schools whilst the interest was on senior secondary schools; and (2) the focus of the studies was on (a) first graduates of Basic Education Teacher Diploma (BETD) perceptions of learner-centred approach to teaching, (b) provision of effective learning environment by BETD Inset teachers, and (c) teachers' understanding of concept LCE equal to group work, respectively.

During the initial stage, the primary author tried to focus on the main objectives as a guide for the design of an instrument. These objectives were: (1) to determine the extent to which secondary school mathematics teachers implement LC approaches in their classrooms; and (2) to determine the nature of classroom challenges and problems experienced by mathematics teachers in their teaching when applying the LC approach.

Many doubts arose as to how to best design a research instrument that would ensure that appropriate and relevant data were collected. After searching and reading related literature, the lead author came across some instruments that were more or less in line with her area of interest. Figure 1 presents an extract from the first attempt at a research instrument.

Most of the questions in section B of Figure 1 were adapted by putting the focus on mathematics and mathematics teaching. The questions in section C (from Shinyemba, 1999) were initially given as statements rather than questions as shown above. For example, number 2 initially appeared as 'In learner-centred education the teacher provides regular feedback to learners'. This statement was also given as a first choice. However, in the revised (adapted) version it was changed into a question. We thought that questions were more clear and straightforward than statements, from the respondents' point of view. The primary author also added her own starting question (number 1) in section C because it addresses the lesson introduction. The aim of the questionnaire in Figure 1 was to give an overview of mathematics teachers' perceptions about LCE in terms of definitions, problems and challenges experienced during teaching, as well as to indicate the extent to which they claim they are practising LCE.

Figure 1: Teachers' views on LCE*

In this section, please express your own personal views on Learner-Centred Education/Approaches.

SECTION B:

1. What do you understand by the term 'Learner-Centred Education'?

2. Describe the role of a mathematics teacher in 'Learner-Centred Education'.

3. Describe the role of a learner in 'Learner-Centred Education'.

4. How often do you use 'Learner-Centered Approaches' in your mathematics classrooms?
   ❑ 1. Never ❑ 2. Sometimes ❑ 3. Very Often
   Elaborate on your choice:

5. What problems do you encounter in using 'Learner-Centred Approaches' during your teaching mathematics classes? (list the problems)

6. What other factors are affecting the implementation of Learner-Centred Education in your mathematics teaching?

7. Have your views about 'Learner-Centred Education' changed since you heard about it?
   ❑ 1. Yes ❑ 2. No
   If yes, explain how your views have changed:

SECTION C: Please answer all the questions by putting a cross [X] in the appropriate box.

HOW OFTEN DO YOU:

1. Start your lesson introduction by using learners' experiences and background and then later build your lesson on the information provided?
   ❑ 1. Always ❑ 2. Sometimes ❑ 3. Not at all

2. Provide feedback to your learners?
   ❑ 1. Always ❑ 2. Sometimes ❑ 3. Not at all

3. Give learners individual assistance?
   ❑ 1. Always ❑ 2. Sometimes ❑ 3. Not at all

4. Expect the whole class to complete or finish the tasks given at the same time?
   ❑ 1. Always ❑ 2. Sometimes ❑ 3. Not at all

5. Encourage your learners to participate in class discussions?
   ❑ 1. Always ❑ 2. Sometimes ❑ 3. Not at all

* *Adapted from: Sibuku (1997) and Shinyemba (1999)*

Before piloting the questionnaire, the instrument was given to a group of colleagues (including the co-authors of this chapter) who provided useful comments and amendments to the questionnaire. The feedback given had certain impact on the questionnaire as the primary author corrected grammar and rephrased or rearranged most of the questions. Figure 2 presents the amendments.

The amended instrument was then piloted using a group of 30 mathematics teachers from different educational regions in Namibia as a convenient group at that particular point in time. These teachers had gone through a two-year in-service training course called the Mathematics and Science and Extension Programme (MASTEP) at the University of Namibia in 2003. The pilot study yielded the following outcomes:

First, mathematics teachers in the MASTEP course held different views and perceptions about LCE. Most of them described LCE as a paradigm shift in educational setting that involved active participation of learners in classroom activities. Second, these mathematics teachers also mentioned several problems that they encountered in using LC approaches in their teaching. These included, among others, factors such as classroom

management, not enough time for planning, shortage of teaching resources, noise, chaos and large classes (overcrowding), to mention just a few. Third, the majority of the MASTEP teachers taking mathematics also indicated a fair degree of using LC approaches in their teaching.

Figure 2: Adaptations of some initial questions on LCE questionnaire

SECTION B:

Before adaptation

1. Explain in your own words what you understand by the term 'Learner-Centred Education'.
2. Describe how you perceive the role of a teacher in a 'Learner-Centred Approach'.
5. Do you encounter problems in using 'Learner-Centred Approach' during your teaching?

After adaptation

1. What do you understand by the term 'Learner-Centred Education'?
2. Describe the role of a mathematics teacher in 'Learner-Centred Education'.
5. What problems do you encounter in using 'Learner-Centred Approaches' during your teaching mathematics classes? (List the problems.)

Blaikie (2004: 15) suggests that a research design, including the research instruments, should be subjected to scrutiny by an audience wider than those closely involved with the research study. In order to open the instrument for scrutiny by such a wider audience, a short paper entitled 'Mathematics Teachers' Perceptions of Learner-Centred Education: A Case of the MASTEP Teachers in Namibia' (Kapenda, 2001) was read at an international conference on science and mathematics education.

After some considerations and reflections on the feedback received after presentation of the short paper, the following shortcomings surfaced: (1) Section B of the questionnaire would provide opinions and views about teachers' implementation of learner-centred approaches rather than giving the exact details of their daily activities in the classrooms – the kind of details that Merriam (1998: 21) refers to as the 'reality' of the findings. (2) Because of the qualitative nature of the study and in order to cater for the second objective of this study, it was clear that this instrument was inadequate. Therefore, it was imperative to revise the instrument in order to cater for this aspect. Based upon this, the decision was made to do

classroom observations as well as to hold interviews with the respondents while ensuring at the same time that the method chosen suited its purpose (Wragg, 1994: 2). Figure 3 is an extract from what is named 'Classroom Observation Schedules' (COS) on LCE.

Figure 3: COS for LCE activities*

A. LCE/non-LCE Strategies Used (check all that apply)

- ❑ 1. Group work
- ❑ 2. Pair work
- ❑ 3. Individual work (assignments)
- ❑ 4. Open-ended questioning (e.g. why, explain, clarify, etc.)
- ❑ 5. Relate lesson to learners' experience and knowledge ('action knowledge')
- ❑ 6. Teacher uses real-world examples to explain some mathematical concepts
- ❑ 7. Teacher uses some manipulatives (hands-on) during teaching
- ❑ 8. Teacher uses a variety of classroom activities that involve learners in hands-on activities
- ❑ 9. Teacher gives frequent and appropriate feedback
- ❑ 10. Teacher is not concerned too much about time management
- ❑ 11. Teacher uses whole group call responses most of the time
- ❑ 12. Teacher varies his/her teaching approaches (combines lecture, activities, demo, etc.)
- ❑ 13. Teacher lectures most of the time

B. Indications that Learners are Actively Engaged (check all that apply)

- ❑ 1. Learners 'talk and act' more than 'sit and listen' in calls
- ❑ 2. Learners initiate questions and comments often
- ❑ 3. Learners are able to use their 'action knowledge versus school knowledge' to explain mathematical concepts
- ❑ 4. Learners are presenting information to others
  - ❑ (i) On the chalkboard
  - ❑ (ii) Talking to the whole class
  - ❑ (iii) During group (or pair) discussions
- ❑ 5. Learners are using the following materials:
  - ❑ (iv) Mathematical sets (tools)
  - ❑ (v) Manipulatives
  - ❑ (vi) Others (specify) ___, ___, ____ ___ ____ ___ ____ ___
- ❑ 6. Learners appear to be animated and interested

C. **Overall, what is your estimate of how often the teacher uses LCE strategies effectively?** (Note: indicators for effective use: achievable lesson objectives, related to meaningful class activities, more points from A and B indicators above)

❑ 1. All the time
❑ 2. Most of the time (more than half of the class period)
❑ 3. Some of the time (less than half of the class period)
❑ 4. Seldom or never

** Adapted from: Van Graan (1999) Classroom Observation*

The outline of this instrument had not changed much from the original source. Here the lead author tried to restructure the different sections of the questionnaire and added a few items here and there. The aim of this instrument was to rate the extent to which teachers practise LCE in the classroom. The instrument was not tested in the classroom, but it was discussed with supervisors. At the end of the discussion it was agreed that the instrument needed modification because it was prone to subjectivity. The first author immediately realised that it was very difficult to get consistent (and therefore reliable) results using this instrument – the COS instrument, for example, does not have a rating scale that provides clear demarcations of events happening in the classroom. It also fails to give a clear indication on how to measure the nature of LC activities. Using relevant literature, the lead author therefore designed another instrument, as shown in Figure 4.

Figure 4: LCE monitoring scale

Name of School: _____
Name of teacher: _____
Topic: _____ Date: _____

	Learner-centred	Teacher-centred
1.	T relates lessons to	Not related to L experience
2.	Use group work/pair	Whole class call response
3.	T gives appropriate feedback	No feedback/inappropriate
4.	T responds to both correct	T ignores L questions
5.	Use of teaching aids	No teaching aids available
6.	L use manipulatives	No manipulatives available

7. L are engaged investigative	No meaningful tasks for L
8. Pupil-pupil interactions	No interaction
9. Teacher-pupil interaction	T controlled interaction
10. T asks more 'why, explain'	More recall questions
11. Gender balance	Gender bias

At this juncture, the primary author realised that she was not paying enough attention to all the objectives of the study; which meant that there were mistakes in the construction of the instrument. She carried out a pilot study at one of the local schools for a period of approximately three weeks using the LCE monitoring scale above. The discussion with the co-authors revealed two main problems: (1) The reliability of the instrument (due to subjectivity). That is, when and how does one decide the extent of rating whether the teacher is balancing learner-centred and teacher-centred approaches, or s/he is at the extreme? (2) The instrument is comparing learner-centredness with teacher-centredness rather than measuring the extent to which mathematics teachers practise LCE in the classroom. Therefore, using this instrument would change the focus of the study. Advice was given to design another instrument. Portions of this instrument are given in Figure 5.

Figure 5: Classroom observation checklist*

In the checklist below, mark the box which best reflects your observation of the teacher's practice. Where necessary make additional comments on your observation.

A. INTRODUCTION

Lesson Introduction

❑ 1. No introduction, i.e. no connection is made with previous lesson. No direction for new lesson. No greetings.
❑ 2. Links with past lesson but no real focus for present lesson.
❑ 3. Links with past lesson and clear focus for present lesson.
❑ 4. Lesson is clearly contextualised and learners' interest is aroused. Attention is focused.

COMMENT (Was the lesson appropriately introduced?)

B. PRESENTATION and RESOURCES

B1. EXPLICIT ORGANISATION OF GROUP WORK

❑ 1. No group work.
❑ 2. Only two or three learners interact. Others just listen.
❑ 3. Group of learners with limited interaction/interact when teacher motivates.
❑ 4. Groups of pupils discuss problems, questions and activities by themselves.

COMMENT (Does the organisation relate to the type of lesson?)

B2. PUPIL-PUPIL INTERACTION WITHOUT TEACHER

❑ 1. Pupils don't question each other or probe for details.
❑ 1. Pupils question each other in secret because this is not allowed/ encouraged by the teacher.
❑ 3. Pupils only question or help other pupils when prompted to do so by teacher.
❑ 4. Pupils freely enter into discussions with each other.

COMMENT (How is the frequency of interactions between pupils?):

B3. WHOLE CLASS TEACHER-PUPIL INTERACTION

❑ 1. Totally controlled by the teacher.
❑ 2. Mainly controlled by the teacher.
❑ 3. Teacher creates opportunity for pupil-pupil interaction.
❑ 4. Control of interaction shifts between pupils and teacher.

COMMENT (If no group work, what kind of pupil-pupil interaction is taking place, if any?) (Frequency):

B4. USE OF RESOURCES/MATERIALS/AIDS e.g. texts, chalkboard and notebooks

❑ 1. No materials available for pupils or teacher to use.
❑ 2. Only the teacher uses the materials in front while the learners are observing.
❑ 3. Some learners use materials.
❑ 4. Learners share and use materials.

COMMENT (Name materials used and frequency; if no materials used):

* *Adapted from: Adler, Lellint and Slammsky (1997)*

With the help ot one of the co-authors, we decided to test the instrument above using the recorded video lessons from the pilot study. At this stage the primary author was excited about the instrument because she thought it was the best. Wrong! The instrument looked great on paper, but the minute we took our pencils and got ready for recording the data we got stuck hke a big lorry in the mud. The primary author did not know where to start and how to proceed with the different sections provided in the research instrument. She therefore noted several weaknesses in the instrument that were worth taking into consideration: (1) The instrument did not have a consistent rating scale. (2) The sections that represent different classroom activities were categorised to the extent that it was difficult forthe researcher to do the rating consistently. (3) The instrument was too long (it covered ten pages). This made the recording procedure very difficult because one had to page through several items before locating the required item. (4) This meant that one would expect different results using the same instrument - the issue of consistency was therefore minimal, if not absent. (5) She also started doubting the internal validity of the instrument. She questioned how congruent the findings would be with 'real issues' and the issue of whether she was measuring what she wanted to measure (Merriam, 1998: 201) became crucial at this stage. Specifically, she realised that this was the fourth instrument in a row, and yet she had still not succeeded in addressing the issue of measuring the extent to which teachers practice LC activities.

At this juncture, the primary author was advised to give a brief presentation about her pilot study at a seminar to PhD students. She presented a ten-minute video segment and asked her colleagues to write short vignettes. The discussion session highlighted the following issues: (1) The research instrument should have at least three LC dimensions derived from literature (excluding teacher-centredness). (2) She should come up with indicators for each LC dimension in order to guide her decisions during data collection periods. (3) She should tally the occurrences of the events she would be observing. Below is an example of what she called the 'Lesson Observation Schedule' (LOS).

Figure 6: Example of a Lesson Observation Schedule

LCE Dimensions (derived from literature)	Indicators	Occurrence (use tally)	Comments (on what is going on)
A: Learners' active involvement in lesson	1. Student-student interaction		
	2. Teacher-student interaction		
	3. Learner-initiated questions		
B: Learners' experiences are used	1. Daily living references		
	2. Connections to other subject areas		
	3. Connections to prior math knowledge		
	4. References to indigenous situations		
B: Higher-order learning tasks are present	1. Problem solving (tasks)		
	2. Problem posing		
	3. Explanation by students (why?)		
	4. Investigations		
	5. Extensions of the lesson		
	6. Projects (small)		

Figure 7: Indicators and descriptors*

Indicators	Descriptions and examples of indicators
A: (1) Student-student interaction	Interactions about math ideas or topic(s) [not matters unrelated to math lesson. E.g. 'let's meet in the hall']. Examples: (a) Asking for clarification ['what does the teacher mean by....?'] (b) 'Do you know how to solve this problem?' (c) Giving an explanation about math topic(s). (d) Any other relevant interesting things (including non-verbal communications).
(2) Teacher-student interaction	Interaction about mathematical ideas. Examples: (a) Giving or asking for an explanation/ clarification. (b) Content dialogue between teacher and students. (c) Any relevant discussion around mathematics topics.
(3) Learner-initiated dialogue	Examples: (a) 'What do you mean by...?' (b) 'Can you please explain...?' (c) Content of the dialogue.
B: (1) Daily living references	E.g. 'How do you balance your current account at the end of the month?'
(2) Connections to other subject areas	E.g. 'In Physical Science, you learned how to calculate the distance travelled using velocity equation.' Note: These references could come from anybody in class (teacher or learners).
(3) Connections to prior math knowledge	E.g. 'Using algebraic equations (expressions), calculate the mean for the following...' Note: Include things covered before or presumed already familiar to learners.
(4) Reference to indigenous situations	E.g. 'A woman in the village weaves beautiful baskets. What types of symmetries are portrayed by her designs?'
C: (1) Problem-solving tasks (Polya)	No routine tasks, not just 'solve for x ' problems. E.g. 'Given a right-angled triangle with sides labelled a, b, and c. How do you prove that $a^2 + b^2 = c^2$? Use diagrams or cardboards or any relevant materials to solve the problem.
(2) Problem posing (T and L)	Generation of problems by teacher or learner or both.
(3) Explanation by learners (Why?)	E.g. Learners give their own explanations.

(4) Investigations (through making hypotheses, enquiry, experimental)	E.g. 'Given circular objects of different sizes, strings, and rulers investigate why pie (22/7) is a constant.'
(5) Extensions	Teacher or learners ask questions or elaborate on the work under discussion. Instances that are going on beyond the already established facts.
(6) Small projects	Learners are given small projects to do or they report back on the project they did earlier on.

* *Compiled by Kapenda*

The lead author tested the LOS instrument using video lessons from the pilot study. She also tried to verify the consistency of the instrument by coding at least two lessons more than once (i.e. by watching the lesson more than once) in order to determine the instrument's consistency. Through repetitions of watching recorded video lessons, the variations were found to be minimal. However, she kept in mind the fact that the reliability of qualitative data can be improved through triangulation of methodologies (Merriam, 1998; Cohen *et al.*, 2000). Moreover, Cohen *et al.* (2000: 129) highlight several threats to validity and reliability in observations that include, among others: (1) the researcher's unawareness of important antecedent events; as well as (2) the reactivity effect due to the presence of the observer (just to mention a few). The primary author was therefore satisfied to use the instrument in the main study, providing that the necessary adjustments were made as the need arose.

Conclusion

Designing and constructing research instruments is not an easy process. It is worth mentioning that the phases (or stages) of constructing a research instrument are non-linear. This means that one has to move back and forth in terms of critical thinking and reflections at each stage. The process is an interactive one because it is subjected to public scrutiny. Specifically, in this case colleagues as well as co-authors were involved in providing constructive feedback. As can be realised by now, apart from reading and consulting various resources and literature, the process also requires good organisation of thoughts and ideas, fine reflection on certain issues (why one way and not another way), as well as consistency in one's work. Each stage or phase requires critical thinking and evaluation of certain issues; namely, usability, reliability and validity. Although these constructions are not measured in qualitative studies in the same way as in quantitative

ones, their consideration remains important. Specifically, the consultation of peers and supervisors provided critical thoughts of enquiry in the design of this research instrument.

We argue that irrespective of whether cognate instruments exit, studies differ in terms of their contexts and sites of implementation and thus require adaptation to be effective in a particular setting – not only as a goodness-of-fit issue. Adaptation is also crucial with respect to ownership. Ultimately, the researcher must own the instrument and one of the most effective mechanisms to ensure personal ownership is through redesign and adaptation.

References

Adler, J., Lelliot, T. and Slonimsky, L. (1997). *A Base-Line Study: Teaching/Learning Practices of Primary and Secondary Mathematics, Science and English Language Teachers Enrolled in the Wits Further Diplomas in Education Programme*. Johannesburg: University of Witwatersrand.

APA (American Psychological Association) (1997). *Learner-Centred Psychological Principles: A Framework for Redesign and Reform*. http://www.apa.org/ed/lcp.html.

Blaikie, N. (2004). *Designing Social Research*. Cambridge: Polity Press.

Chaka, M.V. (1997). *Learner-Centred Education in Namibia: A Case Study*. Unpublished Master's thesis. University of Alberta, Canada.

Cohen, L., Manion, L. and Morrison, K. (2000). *Research in Education* (5th Edition). London: RoutledeFalmer.

Kamupingene, T. (1998). 'Panel discussion opening statement'. In Sguazzin, T. and Van Graan, M. (Eds.). *Education Reform and Innovation in Namibia: How Best can Changes in Classroom Practice be Implemented and Supported? Proceedings from the 1998 NIED Educational Conference* (pp. 124–127). Cape Town: CTP Book Printers.

Kapenda, H.M. (2004). 'Mathematics Teachers' Perceptions of Learner-Centered Education: A Case of the MASTEP Teachers'. In Buffler, A. and Laugksch, R.C. (Eds). *Proceedings of the 12th Annual Meeting of the Southern African Association for Research in Mathematics, Science and Technology Education*. Cape Town: University of Cape Town.

MBEC (1999) (Ministry of Basic Education and Culture) (1999). *How learner centred are you?* Okahandja: NIED.

MEC (Ministry of Education and Culture) (1993). *Towards Education for All: A Development Brief for Education, Culture, and Training*. Windhoek: Gamsberg Macmillan.

McCombs, B.L. and Whisler, J.S. (1997). *The Learner-Centered Classroom and School. Strategies for Increasing Student Motivation and Achievement.* San Francisco: Jossey-Bass Publishers.

Merriam, S.B. (1998). *Qualitative Research and Case Study Applications in Education.* San Francisco: Jossey-Bass Publishers.

Shaalukeni, L.N. (2002). 'Learner-Centredness and Group Work in Second Language Teaching: A Shattered Dream' In Lewis, S.G. (Ed.), *Informing Reform: Namibian Research to Inform Education Policy and Practice.* Windhoek: Multi Services Printers.

Shinyemba, D.N. (1999). *Learner-Centred Education: Development of Teachers' Concepts and Practice of Teaching in the Context of Namibian School Reform.* Unpublished Master's thesis. Oxford Brookes University, United Kingdom.

Sibuku, C.M. (1997). Beginning teachers' perceptions of a learner centred approach to teaching in Namibia. Unpublished Master's thesis. University of Alberta, Canada.

Van Graan (1999). Learner-Centred Education in Namibia: A case study. In Sguazzin, T. and Van Graan, M. (Eds), *Education Reform and Innovation in Namibia: How Best can Changes in Classroom Practice be Implemented and Supported?* Proceedings from the 1998 NIED Educational Conference (pp. 124–127). Cape Town: CTP Book Printers.

Wałczyk, J.J. and Ramsey, L.L. (2003). Use of learner-centered instruction in College of Science and mathematics classrooms. *Journal of Research in Science Teaching,* 40(6), 566–584.

Wragg, E.C. (1994). *An Introduction to Classroom Observation.* London: Routledge.