

**TEACHER RESPONSES TO THE NAMIBIAN EDUCATION REFORM:
A CASE STUDY OF TWO CAPRIVI SCHOOLS**

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ABSTRACT.

Effective implementation of education reforms consists of alterations in curriculum materials, instructional practices and behaviour, beliefs and understandings on the part of the teachers involved in the reform (Fullan and Hargreaves, 1993: 5). A process of implementation is therefore, a learning process, learning how to do something new (*ibid.*).

This study was done to establish how Biology teachers in Caprivi have responded to the reform process ten years down the line. I used a qualitative case study of two secondary schools. Four Biology teachers, two school principals and two groups of learners participated in the study. Data was collected by means of interviews, lesson observations, a workshop, and school inventories. The data was analysed within an interpretive framework.

The results of the study show a move into 'activity-based teaching'. It shows a shift from the traditional transmission teaching approach. In general teachers seem to equate 'activity-based teaching' with the learner-centred approach.

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CHAPTER # 1.

INTRODUCTION TO THE RESEARCH STUDY.

1.1. Field of Research.

Teacher development in Biology Education

1.2. The context of the research

After independence, Namibia adopted a more democratic and participatory approach to teaching and learning, 'the learner-centred approach' to education. This approach is highlighted in the policy document: *Toward Education for All*:

As we make the transition from educating an elite to education for all, we are also making another shift, from teacher-centred to learner-centred education...What teachers do must be guided both by their knowledge of concepts and skills to be mastered and by experiences, interests and learning strategies of their students, MEC Policy Document (1993:10).

The learner-centred approach is within the social constructivist principles that emphasise collaboration and exchange of ideas and the learner as an interactive co-creator of knowledge in a social context (Taylor and Campbell-Williams, 1993). In this construction of knowledge, the learner's 'prior knowledge' should be recognised by the teacher. According to Tobin et al. (in Ritchie, 1998) denying them the opportunity to explore and not recognising their prior knowledge will make them feel disempowered and believe that they do not know enough to interact with the teacher about their limited understandings. The learner-centred approach therefore compels the teacher to shift from "teaching by imposition to teaching by negotiation" (Bodner, 1986:876). This does not mean that the teacher is stripped of her authority but that the teacher should learn to create a classroom climate where learners are free to explore, ask questions and generally make mistakes (Prawat, 1996). The teacher therefore takes on multiple roles including mediator, scaffolder, facilitator and co-learner.

Another requirement for the teacher is that, in these negotiations she is expected to have knowledge of the subject (have more knowledge about the topics and themes she

is teaching) as well as knowledge about the subject. This is knowledge about the origin of knowledge or truth (ontology) and how it changes and is acquired, that is, the epistemology (Prawat, 1992). This means that without sound knowledge of and about the subject teachers will find it hard to change and will remain transmitters of prescribed information (they cannot go beyond the prescribed textbook). They will therefore become major obstacles to change through the adherence to instruction that emphasises factual and procedural knowledge at the expense of deeper understanding (Prawat, 1992). Do the Biology teachers in the Caprivi have the required curriculum and epistemological knowledge to effect the necessary changes? It will be interesting to find out.

Apart from knowledge of and about the subject, the new learner-centred approach to education in Namibia requires reflexive practitioners. According to Carr and Kemmis (in Nichols *et al.* 1997), any approach to teacher education which does not encourage teachers to reflect critically on their own educational views as well as on the nature of education as it is realised in the institutional setting of schools, will be either inherently conservative or doctrinaire. For this change (learning how to do something new or viewing the same situation from a different perspective) to be successful teachers must be given opportunities to confront their assumptions and beliefs underlying their practices and to do something about it. This shift in focus, which allows teachers to see their assumptions with new eyes, is the very act that facilitates their ability to see past their assumptions (Peters, 1998). In the Biological sciences in the Caprivi we have tried to create an opportunity and a community of teachers who discuss and develop their purposes together (Fullan and Hargreaves, 1993). To what extent we have managed this difficult task remains to be seen and is one of the questions that need to be answered in this research project.

I am aware that in our teacher support activities we have not been able to specifically look at every teacher as a person. A teacher as somebody who belongs to a certain age category, has different career and life experiences, as well as belonging to a certain gender group. These are things that make up a total person and affect his/her interest and response to innovation and change and reform (Fullan and Hargreaves, 1993).

Another factor to consider is that in every situation, people (teachers included) make their own choices and according to James (in Aitken and Mildon, 1993:10) educated men and women, “even when they most violate principles, act from their reason, however perverted, and from their affections however misplaced”. This suggests that teachers cannot do it alone without strong support from all stakeholders otherwise they fall back into their old habits.

Given the above scenario it becomes imperative for me as a Biology Advisory Teacher (as part of teacher support services) to try and develop an understanding of the perceptions of the Biology teachers in the Caprivi with regard to the reform process. Secondly try to understand their understanding of the theory underpinning the new learning and teaching strategies. What does it mean to teach in a learner-centred way and what are the demands that this approach puts on teachers and learners? Are they responding to or taking action on their reflections?

I have no doubt that this understanding will inform my practice and help me bridge the gulf between rhetoric and reality. My support to the teachers must be meaningful I feel. And I am convinced that the quality of my service and support can only improve if I operate from an informed position. I also hope that this study will give us as a region and as a system an indication, albeit in a small way, on how far we have come in our education reform process. This may lead to further research and hence better understanding and planning.

1.3. Research goals are to:

- Develop an understanding of teachers’ perception of change in the teaching-learning process.
- Develop an understanding of teachers’ epistemological and curriculum knowledge.

1.4. Thesis outline.

In this case study report I used both the analytic and reflective reporting (Gall, *et al* in Winegardner, not dated: 9). The analytic part comes in because the chapters in the study are arranged in the conventional way: introduction and context; literature

review, methodology, results (the data); discussion of the data and findings. Otherwise the whole report, apart from chapter two, follows a narrative and reflective approach. According to Gall, *et al* (in Winegardner, not dated: 9) reflective reporting uses literary devices such as metaphors to bring the case alive, and the researcher's voice is clearly heard in the report. In this report I present events in a chronological order, focusing on critical or key events, recounting the events through the perspectives of participants (Wolcott in Winegardner, not dated: 9). I am actually reporting the professional lives and stories (narratives) of the participants through their perspectives but at the same time having my voice heard as I intuitively reflect on what the data descriptions are revealing. This justifies the choice of reflective reporting.

This thesis consists of six chapters. Chapter two is written in the conventional and analytical way in the sense that my voice as researcher is silent. At the same time it sets out the theoretical underpinnings of the research as it explains the data (Goetz and LeCompte in Winegardner, not dated: 2). It answers three important questions: where we have come from (behaviourism); where we should be (constructivism); and lastly, the implications of this shift on the teaching and learning process. Chapter three covers the research methodology and identifies the research as a qualitative study under the interpretive paradigm. The phrasing of the research question and research goals reflect this theoretical orientation. It uses the case study method. In the case study method the researcher observes the characteristics of an individual unit and probes deeply in order to analyse intensively the multifarious phenomena that constitute the life cycle of the unit (Cohen and Manion, 1998). This method therefore is appropriate and consistent with the paradigm (interpretive) I have selected as well as with the reflective reporting. It also uses a variety of tools (interviews, lesson observation, and inventories, and learners' written work) in collecting relevant data.

Chapter four presents the voice of the participants of the research. In this chapter direct quotation from the participants is in a small way integrated with the researcher's interpretation. And at appropriate times the participants' voices and researcher interpretation weave with the literature from chapter two. Where this is done the reader is consistently referred to the relevant chapter. In this way an interesting and informative narrative is given (Merriam in Winegardner, not dated: 9).

In chapter five the data is discussed based on the findings (from each participant) of the data analysis from chapter four. From this discussion common findings (from all participants) are identified and briefly discussed based on relevant literature. In this way we are able to see firstly what individual teachers are able to do and secondly the general picture the participants are presenting. As a result of the mentioned procedure, the chapter is divided into three components. First the particular description which consists of quotes from the interviews and other sources. Secondly general description which tells the reader the other parts of the data which are not direct quotations. And finally the researcher's interpretative commentary that provides a framework for understanding both forms of description and grounds this understanding in literature.

Chapter six covers the findings as well as grounding these findings in other similar research findings in from the Namibian and South African contexts. Lastly the chapter covers limitations of the study, recommendations for further research and then the conclusion.

CHAPTER # 2.

THE THEORY THAT INFORMS PRACTICE IN A LEARNER-CENTRED EDUCATION IN NAMIBIA.

2.1. Introduction.

In Namibia policy pronouncements on the theoretical underpinnings of the education reform have been made already. It is now grappling with the implementation of democratic and participatory social constructivist pedagogy with a learner-centred approach to teaching and learning as a model (MEC, 1993; MBEC, 1998). This chapter firstly looks at the paradigm [views on knowledge and learning] in which Namibia operated before the implementation of the current education reform. Secondly a discussion over the theory that informs and shapes the Namibian education system today and lastly the meaning of this paradigm shift and its possible implications on the teachers, the teacher support system and the teaching and learning process in general.

2.2. The view of knowledge before the education reform.

According to van Harmelen (2000 b), knowledge as a concept includes information, concepts, skills, values and attitudes. If the philosophy on which the curriculum is based regards knowledge as collections of 'given' facts, then the theory of learning that will be followed will be based on the belief that facts can be transmitted from the teacher to the learner through a process of 'teacher-tell'. This philosophy is largely based on the idea that education is a scientific and value free endeavour. If on the other hand the philosophy on which the curriculum is based perceives knowledge as socially constructed in many and varied situations then the theory of learning will focus on the learner's need to make meaning. Knowledge will be extended to accept and to build on existing knowledge of the learner gained through social interactions other than those in the formal classroom.

Simply put what we teach and how we teach reflects particular interpretations of what constitutes knowledge. This interpretation is in turn dependent on the worldview that is dominant in that society at a particular moment in time (van Harmelen, 2000 b). Prior to independence Namibia's education system was organised according to "a strong behaviourist model" (van Harmelen, 2001 a: 5).

2.2.1. Behaviourism.

Behaviourism is often classified as psychological theory. It encompasses several areas of learning theory and is therefore difficult to categorise (Ozman and Craver, 1986). According to van Harmelen (1995) behaviourism is perceived as a network of theoretical perspectives held together by the common belief that personal experience is understood and exhibited as behaviour or actions that result from our interaction with our physical and social environment.

2.2.1.1. Historical overview.

The interpretation of the history of behaviourist theories portrayed in this chapter is one of many possible interpretations, and a path among many possible paths through the old curriculum. It will be folly not to recognise this shortcoming right from the start. To answer the above question we have to look at the notion of the origin of science and knowledge and then gradually float our way into behaviourism.

Positivism.

Positivistic theory is based on empiricism which may be defined as "the theory that regards experience, rather than innate attributes or reason, as the only source of knowledge" (Aspin, 1997: 1). During the period of empiricists like Galileo, Bacon and Newton knowledge was regarded as a product of observation and experimentation, that is, it was produced through the use of our senses and reason (van Harmelen, 2000). These methods of discovering science were viewed as the only right way to seek knowledge (*ibid.*). Anything that could not be observed and experimented upon was mere speculation and an individual opinion. This unsubstantiated information (having no empirical evidence) was not scientific

knowledge and thus had no basis and according to Hume, (in Aspin, 1997: 10) must be “committed to the flames”. Facts as revealed through this method were (and still are) the only possible content of true statements (Parker, 1997). Therefore any expressions or statements concerning moral principles, beliefs or wishes, could not be regarded as expressing facts (*ibid.*).

According to Parker (1997: 13) the rise of positivism ensured an intellectual climate that was especially welcoming to an approach to psychology which promised to replace the ‘unscientific’ pseudo-techniques of subjective introspection with proper empirical practices. Psychological terms – thoughts, desires, intentions, feelings, and so on – would be translated into expressions of behaviour or stimulus-response relations and dispositions; elements fit for the role of giving a value to logic’s variables. This heralded the arrival of behaviourist theories.

2.2.1.2. Behaviourism as scientific theories of education.

Education had to find theoretical perspectives and research which could support the required move to universal agreement (Parker, 1997). Behaviourism was therefore born as the theory that would give this theoretical support. As a result the principle of significance was adopted. This principle is a rule that states that data or information should be treated or looked at in one way only otherwise “we shall only end up chasing fantasies” (Brent, 1983: 11-12). Therefore as it was based upon the logic of scientific methodology with its interest in explanation, prediction and technical control, it was seen as vastly superior to the hermeneutic principles underlying the speculative social sciences of which education is one (Giroux, 1997).

Behavioural psychologists like Watson and Skinner gave the scientific approach to education. Watson and Skinner believed that human behaviour could and should be described according to the same scientific principles used in science. And since learning is a human behaviour and because behaviour can be learnt the behaviourists developed a theory about how people learn. To Watson and Skinner “the real purpose of education is to bring about desired changes in behaviour” (van Harmelen, 2000 a: 4).

2.2.1.3. The central behavioural ideas about knowledge and learning.

- Knowledge is out there for us to discover. When it is known then someone who knows will transmit it to someone who does not have it. ‘Knowing’ then means, “having information about” (Hinchey, 1998:41). Therefore teachers are concerned with getting knowledge, discovered from somewhere, into the heads of the learners and educational researchers (with their tests and sophisticated statistical methods) are concerned with finding better ways of doing it. There is no uncertainty in the behaviourist’s mind as to what knowledge is and there is no doubt at all that knowledge can be transferred from the teacher who is an expert, to the learner. Probably the only “question is how best teachers can implement the transfer” (von Glasersfeld, 1988: 311).
- Empiricism. This view holds that knowledge can only be discovered by experience. This means that a researcher can make statements that can only be verified by empirical testing (Cohen and Manion, 1981) and therefore knowledge as defined by this theory, is discovered through the use of senses, through observation and experimentation (van Harmelen, 2000 a).
- The real purpose of education is to bring about acceptable changes in behaviour, which are more or less permanent over time. The change in behaviour is reinforced by stimuli from a manipulated environment. In fact behaviourists conceive a child as an organism ready to be programmed. The teacher decides which programmes the learner should obediently follow in order to learn (Ozman and Craver, 1986. Learners would become better scientists in this manner. As Skinner indicated (in Brent, 1983: 126) “to teach is to edify in the sense of to build...The behaviour of the student can in a very real sense be constructed”.
- The notion that education is value-free. There is no existence of values nor inner states because they cannot be scientifically proven. Anything that cannot be observed through the use of senses is non-existent. “Values, then, appear as the

nemeses of 'facts', and are viewed at best, as interesting, and at worst, as irrational and subjective emotional responses" Giroux (1997: 11).

- Learning occurs step by step and starts from the simple to the complex. Thorndike, Hull, Skinner and Gagne conceived learning as the accumulation of stimulus-response associations (Shepard, 2000). According to Skinner:

The whole process of becoming competent in any field must be divided into a very large number of very small steps, and reinforcement must be contingent upon the accumulation of each step. This solution to the problem of creating a complex repertoire also solves the problem of maintaining the behaviour in strength. ...By making each successive step as small as possible, the frequency of reinforcement can be raised to a maximum, while the possibly aversive consequences of being wrong are reduced to a minimum (Shepard, 2000: 5).

- Determinism. Events or occurrences have causes. The events are determined by other events. And science proceeds on the belief that these causal links can eventually be discovered and understood. Moreover, not only are events determined by other circumstances, but there is also regularity about the way they are determined. It is the ultimate aim of science to account for such regularities in terms of laws and relationships (Cohen and Manion, 1981).

2.2.1.4. The critique of the central behaviourist ideas.

The critics of behaviourism maintain that the behaviourist views are based on faulty and wrong science and that these views emphasise facts as absolute truths (van Harmelen, 2000 a). What is a fact and truth today might be faulty tomorrow. Knowledge is relative and dynamic. For instance Galileo was almost killed by his society for daring to suggest that the world was one of many planets that orbited the sun. The truth at that time was seen to be the fact that the earth was the centre of the universe and of 'God's creation' (van Harmelen, 2000 a).

Knowledge is out there for us to discover and transfer.

This understanding is situated in the dominant view of modernity. Its strength lies in the fact that it relates to that worldview which we either understand best or which we can relate to because it is a shared view (van Harmelen, 2000 a). While we all believe

that there is a real world out there that we experience the critics of behaviourism believe that truth or knowledge is not out there. We impose meaning on this world (Duffy and Jonassen, 1992). This means that we construct our own knowledge. In the classroom the scientific view of knowledge assumes that the teacher is the one who knows and the learner is the one who does not have knowledge. The situation depends on an uneven and unhealthy power relationship where the teacher is in control rather than in authority (van Harmelen, 2000 b).

Empiricism.

This view helps to sort out what has been agreed upon by the research community from casual talk. It therefore ensures faith in research and research results. However the notion of studying science based on the strictly observable does not make sense in some areas. For instance, this epistemology is based on the blind faith that our senses convey true pictures. If the senses were trustworthy, how come that we so often draw wrong conclusions from their messages? This should show that there is a serious difficulty of interpretation and therefore the picture we have of knowledge and that of the world remains questionable (Aspin, 1995; von Glasersfeld, 1988). A phenomenon like a classroom for example can be explained by psychological, sociological, anthropological or political theory. Each of these theories can disclose aspects of what happens in the teaching and learning situation. However none of them is capable of grasping the whole truth of the classroom phenomenon. All of them combined however will still not enable one to understand the educational phenomenon in its entirety as it appears (Vandenberg, 1997). And therefore none of these perspectives including the observation and experimentation method should claim superiority over the other in all respects.

The real purpose of education is to bring about desired changes in behaviour.

Behaviourism focuses on objectivity, efficiency and technique and these are embedded and reproduced in the curriculum of the school (Giroux, 1997). Of course the idea is to produce better scientists and the best way to do it was to provide the sort of behaviour that would produce these scientists. This could be done through conditioning. In fact Watson claimed that through the schedules of reinforcement and in a controlled environment, he could “make any child into whatever is desired, be it a genius, a gentleman or a criminal” (van Harmelen, 2000 a: 5).

The above views are comforting to the human heart. “We believe that science will solve our problems and result in progress. Progress, we believe, will improve our quality of life and make us happier. And we all want happiness” (van Harmelen, 2000 a: 11). In this sense then behaviourism has strengths. However according to Smith, (in Peters, 1998: 37) “learning is what the brain does naturally, continually” and that it is “only in artificially contrived experimental settings or instructional situations that the brain usually finds itself not learning”. Critical thinking is another dimension of learning. Behaviourism as we have seen, reduces learning to a set of practices that neither define nor respond critically to the basic normative categories that shape day to day classroom methods. The objectification of meaning results in objectification of thought itself and ends up denying critical thinking and reflection (Giroux, 1997).

The notion that education is value-free.

Challenging the value neutrality claims does not mean supporting the use of bias, superstition and prejudice in the scientific enquiry, but the severance of knowledge from values might hide more than it uncovers. Communities of scholars and researchers having their own beliefs have established the methods used in the actual research. To separate values from facts is impossible to achieve and therefore pointless (Giroux, 1997).

From the simple to the complex.

It becomes easier in the classroom to start from what the learners find easy to understand and then to build on and gradually increase the level of difficulty. It sounds logical and easy to prepare and organise (van Harmelen, 2000 a). As Bloom has indicated:

So long as the simpler behaviours may be viewed as components of the more complex behaviours, we can view the educational process as one of building on the simpler behaviour (in Brent, 1983: 133.)

However this step by step teaching (or these reductionist tendencies) especially if not integrated makes it difficult for the learner to get the whole picture. This is compounded by the fact that the curriculum is divided into several subjects, which serve as menu of information and skills. According to Shepard (2000: 67), an

intelligent thought involves self-monitoring and awareness about when and how to use skills and that 'expertise' develops as a principled and coherent way of thinking and representing problems, and not just an accumulation of information. Behaviourism therefore creates a form of "tunnel vision" (Giroux, 1997: 13).

Determinism.

There are many things that can be explained by cause and effect. For example when the heart stops someone dies. However to make a generic claim "that only that which can be explained by cause and effect is truth, is wrong. It is therefore not possible to justify all knowledge on this basis" (van Harmelen, 2000 a: 11).

2.2.1.5. The Behaviourist Curriculum.

According to Hinchey (1998) curricula were organised around discrete subjects and each subject functioning as a sort of repository of important facts. Learners had biology lessons to learn about biology, and history lessons to learn about history. Controlled and structured tests and national examinations were given to the learners to test how much has been learnt at the end of instruction. Assessment was summative in nature (Wilmot, 2000). This shows that assessment and instruction were separate in both time and purpose (Graue in Shepard, 2000). Assessment was based on tests, and the test questions usually had one right answer. After all a fact is a fact (Hinchey, 1998). It is clear then that the intention was to provide an education system that, because it was controlled by a precise set of learning outcomes, would result in producing learners that achieved "exactly what society saw as desirable" (van Harmelen, 2000 a: 6).

How were these views of knowledge perceived and implemented in South African education system (including Namibia)?

2.2.2. The South African model of behaviourism: Fundamental Pedagogics (FP).

2.2.2.1. The historical overview of FP.

During the period of behavioural theory by fate or pure coincidence the South African National Party came into power. This government used ‘behavioural theories’ with roots in behavioural psychology to entrench its particular educational ideology (van Harmelen, 2000 a: 6). Fundamental Pedagogics [FP] was therefore created as a philosophy of education or principles of education (Oberholzer in du Plooy et al, 1982). An ideology in this sense would be defined as beliefs and theories about education which serve to obscure the true nature of social reality from pupils, parents and teachers and which serve the interest of the ruling group (Ashley, 1989).

2.2.2.2. Central FP premises on education.

- Education should be based on the Christian Gospel. A Christian education is necessary to ensure the proper development of the child, particularly in view of intrinsic human weakness and temptation to sin (Ashley, 1989).
- Each community has its own worldview and therefore each should develop its own type of education (van Harmelen, 2000 a). After all mankind was divided into nations and education should reflect these national differences (Ashley, 1989).
- Education as an activity ought not to be concerned with values, but should instead be based on scientific principles. FP was therefore developed as a scientific theory for educational practice where knowledge is neutral and value free. It could thus be introduced in all schools because “it could not offend any cultural philosophy” (van Harmelen, 2000 a: 8). It certainly shows its links with behaviourism.

2.2.2.3. The FP Curriculum.

It should be mentioned that the central ideas of the behaviourist curriculum also apply here. After all FP is another interpretation of behaviourist theories. According to Ashley (1989) curricula worldwide are usually influenced by ideology. In the case of

South Africa a Christian Nationalist outlook dominated the curriculum. Syllabus determination and textbook prescription followed Christian Nationalist thinking.

In the teaching-learning situation the learner was regarded as a non-adult who should be moulded to adulthood. During the moulding process she had to accept authority and be obedient. The teacher herself exercised her authority unapologetically (Smit in Ashley, 1989).

2.2.2.4. The critique of FP.

The success of this education system and of course of Fundamental Pedagogics lies within the notion that truth cannot be challenged and is not questioned because it is based on the principles of science (van Harmelen, 2000 a). Why question ‘facts’ discovered by credible researchers anyway [own emphasis]. Why question accountable knowledge (valid and objective truths) pronouncements? It is knowledge that was systematically obtained, ordered, and intersubjectively verified by pedagogicians practicing pedagogics by making use of accountable methods (Van Zyl in du Plooy et al, 1982). It was therefore simple and easy to follow the recipe.

That said, the doctrine of FP has had fundamental and profound effects on teacher thinking and practices. Teachers and learners were trained and taught through a series of subject content, which brooked no analysis or critique (Taylor and Vinjevold, 1999). According to the NEPI report (in Taylor and Vinjevold, 1999: 133) FP had a “debilitating effect” and prevented teachers from developing an understanding of the relationship between education and the context in which knowledge and understanding are created and shared. According to Hartshorne (in Taylor and Vinjevold, 1999: 133) this closed and narrow ideological approach to teacher training failed to produce teachers of quality and commitment. In addition Enslin (in Taylor and Vinjevold, 1999: 133) asserts that FP “headed off the possibility of critical reflection on that system by making reflection illegitimate”. She goes on to argue that FP justified authoritarian practices and silenced teachers as only those with the science [knowledge] were qualified to speak. To her FP is an approach that produced useful and docile teachers. Chisholm (in Taylor and Vinjevold, 1999) who contends that FP blocked and hindered the development of critical and innovative teaching strategies echoes these views.

In conclusion traditional behavioural theories [including FP] assume that “our minds contain images that represent reality as if they were copies or pictures” and therefore knowledge could be judged as true or false based on these images (Bodner, *et al*, 2001: 1). It is judged true if and only if it corresponds to reality (*ibid.*). In this sense knowledge as truth could not be challenged and not questioned because it is reality (van Harmelen, 2000 a). This understanding shaped the way classrooms were built, the way teaching was done, the way learners’ knowledge was assessed and the way the teacher’s role in the classroom was understood (Bodner, *et al*, 2001). Most classrooms were arranged in a way that all learners faced the teacher, who was presumed to be the sole source of the knowledge to be learned (Bodner, *et al*, 2001). Assessment was based on examinations that tested whether the learners have learned by comparing their answers with the examiner’s memorandum thereby determining whether the answers were true or false (Bodner, *et al*, 2001). The emphasis was on facts per se.

According to von Glasersfeld (1983) apparently something went wrong. The understanding of knowledge as described above did not work out as expected anywhere in the western world. Educational efforts were failing to find the knowledge to match reality in much the same way that one might match samples of paint (von Glasersfeld in Bodner *et al*, 2001). In the classroom there was no match between teaching and learning, knowledge was not transferred intact from the teacher to the learner as expected (Bodner, *et al*, 2001). This led to the questioning of the presuppositions on which this understanding of knowledge was based. As a result of the questioning and inspection of the old suppositions, alternative learning theories have come into being. The understanding that knowledge is transferred intact from the mind of the teacher to the mind of the learner, and whether it is true or false does not hold water today (Bodner, *et al*, 2001). Rather the understanding now is that knowledge is constructed in the mind of the learner (*ibid.*). Teaching and learning are not synonymous as we can teach and teach well, without having learners learn (Bodner, *et al*, 2001).

From this perspective it was clear that the new democratic Namibian government had to follow the latest trends and replace behaviourist theories and practices with the new

understanding of knowledge and how one comes to learn. The democratic social constructivism model with a learner-centred approach to teaching and learning was thus implemented (van Harmelen, 2000 c; MEC, 1993; MBEC, 1998). The learner-centred approach takes as its starting point the learner as an active, inquisitive human being, striving to acquire knowledge and skills to master her surrounding world (MBEC, 1998). It recognises the potential of prior knowledge, the role of peers and the support of the teacher in teaching and learning (*ibid.*). It also recognises the role of the teacher as that of more than just a vehicle for transmission of information from curriculum developers to learners:

It is essential that teachers see themselves as contributors, ...active participants and not passive intermediaries [between curriculum developers and learners]. Just as education is a foundation for development, so is it a foundation for democracy. Building those foundations must be a conscious process in which all learners are engaged. Our challenge is to develop strategies to make it possible for learners from varying backgrounds and with differing abilities to all progress. Indeed, it is precisely for that reason that a learner-centred approach is so central to the new education system we are creating (MEC, 1993).

Social constructivism is one of the “forms of constructivism” (Bodner, *et al*, 2001: 3). A discussion of these theories will follow.

2.3. Constructivist Theories.

Constructivist theories of knowledge are based on the assumption that “knowledge is constructed in the mind of the learner” (Bodner, *et al*, 2001: 1). In contrast to the past mechanistic theories of knowledge acquisition constructivism assumes that learning is an active process of cognitive or mental construction and sense making. It is also based on the premise that existing knowledge structures and beliefs “work to enable or impede new learning” (Shepard, 2000: 6). Fosnot (1992: 171) calls constructivism a theory of ‘knowing’ and a theory about ‘coming to know’. Some theorists add another dimension, that of more than just learning and how to learn but also as theories that view “education as a system” (van Harmelen and Boltz, 2000: 12). This means that in a constructivist model advancement of knowledge depends on linking the findings of research (theory) with its effectiveness in action (practice), and on

building theory from effective practice (Luckett, 1996). This relationship is not static but evolves and develops as education is transformed to higher levels (van Harmelen, 2001 b).

In this sub-topic a historical overview of the origin of constructivist theories will be discussed. Thereafter a discussion of three forms of constructivist theories will follow. Lastly common threads or central ideas that unite the three theories together will be identified. After which a critique of the constructivist theories in general will follow.

2.3.1. Historical overview

As a philosophy of learning, constructivism can be traced at least to the eighteenth century and the work of Giambattista Vico (von Glassersfeld, 1991; Brooks and Brooks, 1993; Riegler, 2000). He held that humans could only clearly understand what they have themselves constructed. Although the psychological works of theorists like Lev Vygotsky and Jerome Bruner made constructivism prominent, Piaget's genetic epistemology however marked the origin of research in learning (Bertrand, 1995: 51).

Constructivist theories that will be discussed in this chapter are radical constructivism; social constructivism and critical constructivism.

2.3.2. Radical Constructivism.

The notion of "radical constructivism" was coined by von Glasersfeld (Reigler, 2000; Bodner, *et al*, 2001) in order to emphasise that from an epistemological perspective any constructivism has to be complete or radical in order not to relapse into some kind of fancy realism. Radical constructivism is based on two principles. Firstly knowledge is actively constructed rather than perceived through senses. Secondly radical constructivism has cognition in an individual as its focus (Ernest, 1993; Reigler, 2000; Bodner, *et al*, 2001). Radical constructivism does not make statements about an outside reality (Reigler, 2000). Therefore to know is not to possess true representation of reality out there but rather to possess ways and means of acting and thinking that allows the realisation of the goals one has chosen (von Glasersfeld, 1991).

Radical constructivism, like the other constructivist theories, regards learning as continual building, testing and development of cognitive structures (Bodner, *et al*, 2001). According to Prawat (1992) and Jessel (2000), the progress in development may be smooth especially if the new information is consistent with pre-existing knowledge. This means that it becomes easy for the learner to make connections. Piaget refers to this as assimilation. On other occasions however, new experiences may not fit into existing structures. In this case a learner tends to accommodate the new information until such time that structures are created in order to make sense of things in a different way. This Piaget calls accommodation. In summary knowledge is not judged in terms of whether it is true or false but in terms of whether it works satisfactorily in the context in which it arises (Bodner, *et al*, 2001).

2.3.3. Social Constructivism.

By focusing on the individual learner, radical constructivism seems to either neglect or ignore the ways in which social interactions influence the process by which knowledge is constructed (Bodner, *et al*, 2001). Social constructivists regard the learner and the social, indissolubly interconnected (Ernest, 1993). This view identifies the learner as a co-creator of knowledge in a social setting where the immediate environment has an influence. There is nowhere, as held by positivists, one can go and discover knowledge in fact “there is no knowledge without the knower and the knower participates in all acts of understanding” (Kincheloe in Crebbin, 1999: 2). Discovery teaching therefore involves not so much the process of leading learners to discover what is ‘out there’, but rather, their discovering what is in “their heads” (Bruner in Fisher, 1995: 220).

In teaching and learning culture and language play a pivotal role (Taylor and Campbell-Williams, 1993). Due to the influence of Vygotsky it is increasingly recognised that much instruction and learning takes place directly through the medium of language, which can be verbal or otherwise (Ernest, 1993; Hinchey, 1998; Murray, 2000). As we talk, we manipulate our thoughts, which lead us to higher cognitive processes (Wink, 2000: 95). This understanding of knowledge and learning rejects the existence of a single and correct reality because all we know of the world

are human interpretations of our experience of the world (Bednar *et al*, 1992). In addition interpretations of the world do not take place in a vacuum but are influenced by context (Crebbin, 1999). According to Bourdieu (in Crebbin, 1999) meaning making is never done in isolation from its social context. This means that both development and learning are socially determined (Vygotsky in Murray, 2000). Indeed both development and learning are primarily social processes (Shepard, 2000). Therefore,

Instruction should not focus on transmitting plans to the learner but rather on developing the skills of the learner to construct (and reconstruct) plans in response to situational demands and opportunities (Duffy and Jonassen, 1992: 4).

In a social constructivist classroom, the construction of knowledge or learning is based on an understanding that the learner needs support in order to develop deeper understanding of the issue at hand. This process of ‘scaffolding’ or support by either the teacher or fellow learners is essential and has more potential for development than radical constructivists think (Murray, 2000; Shepard, 2000). Vygotsky described the gap between what the learner can do alone and with the help of the teacher or friends as the “zone of proximal development” (Murray, 2000). Social constructivism therefore draws “attention to the importance of social processes of negotiation and consensus-building” (Taylor and Campbell-Williams, 1993: 12). What this means according to Vygotsky (Fisher, 1995; Wink, 2000) is that what the learner can do with others today she can do alone tomorrow. Rogoff (in Wood, 1998: 101) calls the scaffolding by the teacher as “guided participation”.

Another premise is that prior knowledge plays an important role in the construction of knowledge (Brooks and Brooks, 1993). Prior knowledge is understood to mean the knowledge, experiences (from home or previous lessons and other experiences), skills, myths, taboos and beliefs the learner brings to the classroom (Brooks and Brooks, 1993). Vygotsky calls it spontaneous knowledge (Murray, 2000). For Piaget, as we have seen in the discussion of radical constructivism, spontaneous knowledge would make assimilation easier.

2.3.4. Critical Constructivism.

Hinchey (1998) asserts that all constructivists are not critical theorists but all critical theorists are constructivists. “It should be stressed that there is no one critical pedagogy” (McLaren inWink, 2000: 28). There are as many definitions and interpretations as there are theorists. Critical construction:

Is a way of thinking about, negotiating, and transforming the relationship among classroom teaching, the production of knowledge, the institutional structures of the school, and the social and material relations of the wider community, society, and nation state (McLaren inWink, 2000: 30).

The notion of power is involved. What the learner does or learns should liberate her so that she can in turn participate in liberating her community from the status quo. To be able to do so, Wallace (in Pomuti, 2000) postulates that she should be able to understand herself and society based on an understanding of individual and societal inhibitions. Put simply, education should be relevant and continuously critiqued.

Critical constructivists believe that there is “no part of the status quo that should not be challenged” (Wink, 2000: 93). It is important for societal transformation to name the –‘ism’. Put it on the table where all can reflect on it, talk about and deconstruct it (*ibid.*). They also believe that we are all limited in our individual perspectives (Hinchey, 1998). Before we can claim to know anything, we have to consider what a variety of others can tell us. No one else can give us a single accurate picture of what the world is. We have to construct our own understanding of the world ourselves, basing it on a variety of sources (Hinchey, 1998). Therefore the facts of science are only one set of facts. We need to be informed by science but also by other sources like art (*ibid.*).

In the classroom the teacher should make an arrangement where learners can share each other’s perspective. It is only by adding their vision together that they can begin to understand and make meanings of what they are studying (Hinchey, 1998). Another issue is that they must be given various activities designed to give them various skills as well as various perspectives. They have to understand that there are multiple realities that actually exist in the world. To pretend to learners that a single worldview

or understanding can be accurate and to ignore the different views is to distort their vision (Hinchey, 1998).

Although critical theorists argue that thought and action are indivisible, they are blamed for being too theoretical and not practical enough (Wallace in Pomuti, 2000).

2.3.5. The central constructivist ideas.

We have discussed three “forms of constructivism” which focus on different aspects of the process by which knowledge is constructed (Bodner, *et al*, 2001: 3). As we have seen from the discussions of these constructivist theories, there are many common threads that unite them that we are going to identify here.

The following assumptions, common threads or central ideas help to identify constructivism as theory:

- a). Knowledge is constructed in the mind of an intellectually active learner.
- b). The notion of prior knowledge or conceptions.
- c). There are multiple realities.
- d). The notion of context.

2.3.6. The critique of constructivist theories.

From the above central constructivist ideas there is much that is laudable, insightful, and progressive about constructivist theories and practice. Constructivism stresses learner engagement in learning and the importance of understanding of the learner’s current conceptual schemes in order to teach fruitfully. It stresses dialogue, conversation, argument, and the justification of learner and teacher opinions in a social setting. Importantly constructivism’s stress on understanding as the purpose of education is a major advance over rote learning and mantra-like repetition of formulae that characterise so many science classrooms (Matthews, 1992).

However having said this much, the critics of Constructivism feel that,

* Constructivists have elevated “whim” to the status of “knowledge” and are undermining a solid, stable, dependable world with an irrational worldview or paradigm (Hinchey, 1998: 55).

* Secondly having correctly pointed out the major error in empiricist assumptions, it then swings to a relativist epistemology without abandoning the empiricist paradigm itself. The relativist only falls within the empiricist paradigm. Epistemologically therefore constructivism is the empiricist wine, so criticised by constructivists, served up in new bottles (Matthews, 1992).

* Thirdly the psychological premises 'the mind is active in knowledge acquisition' to the epistemological 'we cannot know reality' (we construct reality) is endemic in constructivist writing. But this conclusion only follows on the assumption that Aristotle had in fact correctly delineated the problem of knowledge; the conclusion only follows if the terms of the problem as stated by Aristotle are accepted. If this assumption is rejected then none of the skeptical conclusions of Constructivism follow (Matthews, 1992: 3).

* The fourth argument is that of prior knowledge. As we try to know more about learners, a form of surveillance becomes more pervasive and intrusive yet without appearing to be oppressive. (Edwards and Usher, 1994). It is thus a skillful way of oppressing learners.

* The fifth point of contention is the learner-centred approach which constructivists advocate. It is an empowering and humanistic form of teaching and learning where power appears to more equally shared and where authoritarian relationships have been put to one side. But the argument is that power engenders resistance and challenge and never wholly disappears. Thus current changes in theory and practice of teaching and learning do not represent an abandonment of the exercise of power but more subtle refinements (Edwards and Usher, 1994). According to Marshall, (in Edwards and Usher, 1994: 6)

...Power is still exercised in the search for normalised and governable people. If it is more humane, it is more subtle, if it is less overt and involves less violence to bring power into play, it may be more dangerous because it is insidious silence.

* The sixth point deals with the understanding that in constructivist pedagogy continuous assessment is the engine of the curriculum. It is a pedagogy in which each performance is clearly circumscribed by the performance criteria. Where clear standards are set for performance against which learners are assessed; these standards and assessment processes are shared with the learners. In this way the learners are encouraged to monitor and reflect on their own work with the help of the teachers (Wilmot, 2000). At the same time the learner's performance is charted in progress reports through various elements and levels. The argument is that as we continuously assess the learners (which is positive and perhaps well intended) we also in another sense continuously expand our surveillance over the learners. We are also continuously disciplining the learners (whom we are supposed to empower) through goal competent behaviour at every stage of the process. The learner becomes a bundle of competences. There is no space for independent thought or action along the way if one wishes to achieve competence and find a space in the workforce (Edwards and Usher, 1994). So teaching and learning, as it was in the modern world, is geared towards employment in today's world.

Another dimension to this argument is that because the assessment standards and processes are shared and are therefore public, they appear even more objective forms of measurement from which the exercise of power is drained. At a glance they appear to be empowering the learners but in essence learners themselves become the subjects of their own surveillance. They are able to sit in judgement upon themselves. This is therefore discipline through self-discipline which, is simply behaviourism in a new guise (Edwards and Usher, 1994).

In summary behaviourist epistemology focuses on intelligence, domains of objectives, levels of knowledge, and reinforcement. Constructivist epistemology on the other side assumes that learners construct their own knowledge on the basis of interaction with their environment (Gagnon and Collay: not dated).

2.4. Social constructivism in Namibia and its implications on classroom practice.

The fundamental purpose of education is to prepare young people for life in society. Since societies everywhere keep on changing and developing it is expected that education as well be bound to change. “There is nothing new about educational change, indeed, change can be seen as a norm, the stable state” (Sikes, 1993: 36).

It was mentioned that Namibia’s education before the reform was located in strong behaviourist theories. According to van Harmelen (2001 a) an education system located within these theories is notoriously ‘top down’.

A feature of such a system is a rigid hierarchical structure which serves to marginalise all but very few and, in so doing, erodes not only their ‘political power’, but their epistemological power (van Harmelen, 2001 a: 6).

Having discussed where we came from and where we should be at the moment, we will then look at the demands that this shift into constructivism puts on the teaching-learning process, the teacher support services, and on the teacher herself. Lastly we will look at implications of reflexive practice on a learner-centred approach to teaching and learning.

2.4.1. The education reform and its demands on teacher support services.

The way we think about teachers and learners is a result of a dominant philosophy that operates within the teaching-learning situation. After independence, the shift into constructivism meant that all educators irrespective of their qualifications needed induction into the theory and practice underpinning the new model. The legacy of disempowerment brought about by fundamental pedagogics had to be addressed (van Harmelen, 2001 a). Whether this was addressed or not, is not the issue now. The demand is on teacher support services to give teachers the necessary support.

* Teachers are supposed to be given the opportunity to participate in educational issues beyond just the preparations of lessons. The shift in the reform strategy from a top-down approach to a democratic approach should give opportunities to teachers to confront the assumptions and beliefs that underlay their practices (Fullan and

Hargreaves, 1993). Following recipes and specifications laid down by policy makers who neither know them or the contexts in which they work will curtail teachers' professional freedom and autonomy (Sikes, 1993). It should be stressed that "educational change depends on what teachers think and do, it is as simple and as complex as that" (Fullan in Fullan and Hargreaves, 1993: 38).

* Another important dimension to teacher empowerment is the realisation that the teacher, like the learner, cannot do it alone (Bennett in Johnson and Johnson, 1994). In an education system like we have in Namibia the school is a social institution where interaction between all stakeholders should be the norm. The teacher's isolation in her classroom works against "reflection-in-action" (Schon, 1983: 333). She needs to communicate her private puzzles and insights, to test them against the views of her peers (*ibid.*). Space and time should be created for teachers to have dialogue amongst themselves and between them and their learners. This brings the principal and her deputies into the equation. The norms of collaboration do not simply just happen or spring spontaneously out of teachers' mutual respect and concern for each other (Rosenholtz in Leithwood, 1993). School managers should plan for them. The principal must have teacher development strategies in her plans. One could be a strategy where teachers are encouraged to consciously reflect on their own practices, share ideas about their instruction, and try out new techniques in the classroom (Oberg and Field, in Leithwood, 1996). Team teaching opportunities that create the need to plan and carry out instruction with colleagues must be encouraged (Leithwood, 1996). This understanding also demands that teacher support services should have a high degree of accessibility to the teachers they serve. Support personnel like advisory teachers and inspectors need to be perceived as sympathetic and constructive consultants and colleagues. The role of this batch of professionals should therefore be different from that of the more traditional inspectorate (van Harmelen, 2001).

* In addition teachers are literally chasing prescribed syllabi. They have to be completed before yet another examination (Wilmot, 2000). We are therefore well and truly into a system that Wink (2000: 170) calls "pedagogy of coverage". The professor of statistics in the following example sounds all so familiar:

Student: Professor, I did not understand the first problem. Would you please repeat your explanation?

Professor: No, I have no time to repeat; I have 49 more problems to cover.

Student: Yes, but if I don't understand number one, it really doesn't matter what you do with the remaining 49 [Wink, 2000: 170].

This means that teachers need help in order to fend off the effects of external examinations. Since the curriculum is still determined by the so-called experts, the call from the teacher is that of reducing the over-loaded syllabuses. We teach and assess so as to enhance learning and not coverage of a lot of content (Wilmot, 2000). According to McDermott (1993), development of a functional understanding cannot take place unless learners themselves go through the reasoning involved in the development and application of concepts. Moreover to be able to transfer a reasoning skill learned in one context to another, learners need multiple opportunities to use that same skill in different contexts. The entire process requires time. Inevitably, this constraint places a limit on both the breadths of material that can be covered and the pace at which instruction can progress. New topics cannot be added without omitting others. Choices must be made. Unless we design instruction to meet the needs and abilities of learners, efforts to update the teaching of Biology or any other subject, will produce little of either intellectual or motivational value. Therefore the whole culture of the classroom has to change.

* The support that teachers receive in the form of inservice professional development should be systematic and long term (SEDLetter, 1996). In this way the teachers will have time to practice what they learn and be able to reflect on this practice. Workshops should be planned in such a way that teachers can create models of lessons together with teacher educators. These lessons can then be applied in the teachers' classrooms. This will greatly improve their teaching because teachers teach how they are taught and not how they are told to teach (SEDLetter, 1996). This suggests that the teacher support services should not only describe the new ways of teaching and expect the teachers to translate this talk to action (SEDLetter, 1996).

2.4.2. The education reform and its demands on the teacher.

* The teacher is expected to have knowledge of the subject (more knowledge about her area of expertise) as well as knowledge about the subject. This is knowledge about the origin of knowledge or truth (ontology) and how it changes and is acquired, that is, the epistemology (Prawat, 1992). Without a sound knowledge of education in general and their subject areas in particular teachers will be nothing but transmitters of prescribed information (van Harmelen, 2000 b). The better informed the teacher is about the theory on which she bases her teaching, the more effective she will be in her teaching. In fact knowledge about education and expertise in one's subject are the foundations of all teacher empowerment (van Harmelen, 2000 b). In this way the teacher can rise, challenge and fight the status quo because; "power concedes nothing without demand. It never did, and it never will" (Douglass in Wink, 2000: 93). A teacher inspired to change into constructivist instruction must accommodate these realities into her approach to teaching (Brooks and Brooks, 1993).

* Teaching is about:

Establishing bonds and forming relationships with students, making classrooms into places of excitement and wonder, ensuring that all students are included and no one feels an outcast, and so on. This involves a lot of emotional labour for teachers – a labor of love to be sure, but hard labour all the same (Hargreaves in Newman, 1998: x).

What this entails in a constructivist classroom is that the learners should be given the opportunity to manage their own learning and this will in a way make them become autonomous thinkers (Perkins, 1992). However in this radical shift from an authoritarian system to a democratic one, "the conceptual frameworks may encompass a cultural capital that is foreign or even alien to the learner" (van Harmelen, 2001 a: 8). Therefore the scaffolding process of moving the learner from one level of understanding to a deeper level should be the norm. The teacher must understand that learning involves minds, that is, thinking and active mental engagement (Brodie, 2000). It is thus expected that the teacher will challenge learners either to construct models and or at least ponder the merits of alternative and better models (Posner *et al* in Perkins, 1992). Unfortunately, very often, appropriate

scaffolding is not part of the repertoire of teacher development. This and classroom size make scaffolding difficult to implement in class (Perkins, 1992).

* Another aspect of teaching is that it involves the recognition of prior knowledge. Finding out what the learner is thinking, why she thinks in this way, and trying to mediate between her current meanings and the scientifically accepted meanings (Brodie, 2000). In a way the teacher should try to develop and expand what the learner already knows by providing the learner with additional perspectives, areas of conceptual understanding, skills and competencies (van Harmelen, 2000 b). She will then perhaps develop them or reorganise them in her own way (Bertrand, 1995).

* From the same perspective the teacher should understand that the learner might engage in cooperative, competitive or individualistic efforts when the opportunity arises. According to Johnson and Johnson (1994) this social independence exists continually. It is one of the most fundamental and ubiquitous aspects of being human, and affects all aspects of our lives. Nothing is more basic to humans than being 'for', 'against' or 'indifferent to' other people (*ibid.*). In a learner-centred classroom where learning should be communicative, the teacher should be able to draw "on a range of methods as appropriate for different groups of learners and the task in hand. These include group and pair work, learning by doing, self- and peer-assessment" (MBEC, 1998: 2). Knowing how and when to structure learners' learning goals cooperatively, or individualistically is one of the most important aspects of teaching (Johnson and Johnson, 1994). Cooperative and individualistic learning emphasise the importance and beauty of learning together yet recognising our individual space. After all "winning isn't everything. It is the only thing" (Vince Lombardi in Johnson and Johnson, 1994: 9).

* Another demand is the awareness of how learners feel and see the teaching and learning process. "We cannot educate intelligently if we do not know what it is we are educating" (Garrison, 1998: 111). More often than not there are strong connections between how we teach and how we think learners learn. We have high expectations about the quality of the learners' learning but are frequently disappointed that these learners are not able to make sense of the information in the way we expect. We

therefore need to give more consideration to how learners interpret their role and their definition of learning (Crebbin, 1999).

2.4.3. The notion of critical reflection in learner-centred education.

To be able to address the demands identified above the teacher and teacher support services will have to be reflective practitioners (Schon, 1983) because the key to wisdom is constant questioning (Abelard in Fisher, 1995). Cranton (1996: 75) calls reflection “a goal of education”. There is a diversity of meanings of reflective practice and hence the confusion regarding the concept reflective teaching (Waks in Pomuti, 2000). Schon (1983) covers important areas of reflexive practice that we are going to briefly discuss. We will also look at Zeichner’s reflection as critical inquiry.

* Schon’s reflection-in-action (1983).

According to Schon (1983: 337) a reflective practitioner is “one who reflects-in-action” and tends to question the definition of her task, the theories-in-action that she brings to it, and the measures of performance by which she is controlled. In a school supportive of reflective teaching, teachers would challenge the prevailing knowledge structure, challenge the rigid order of lesson plans, schedules, isolated classrooms, and the objective measures of learner and teacher performance (Schon, 1983). They would also question the fundamental idea of the school as a place for the progressive transmission of measured doses of privileged knowledge (Schon, 1983). In the classroom itself the teacher should try to listen to her learners. “She asks herself for example, Why is he thinking like this? What is the meaning of his confusion? What is it that he already knows how to do?” (Schon, 1983: 332). If she listens to her learners she will entertain ideas for action that transcend the lesson plan because as she begins to understand how the learner thinks, she may invent new questions and new activities for the learner. The lesson plan should be put aside then or become a skeleton around which the teacher develops variations according to her on-the-spot understanding of the problems of particular learners (Schon, 1983). At the same time supervision would concern itself less with monitoring the teacher’s coverage of curriculum content but support the teacher’s reflection-in-action (Schon, 1983). The supervisor would inquire into teachers’ understanding, confronting what she thinks is poor teaching while at the same time inviting teachers to confront their own understanding (Schon, 1983).

* Zeichner's reflection as Critical Inquiry (Adler, 1991).

Three levels of reflection are identified here. The first is the technical level where teachers reflect upon the effectiveness of their teaching strategies: have the learners the given set of objectives? The second level places teaching within its situational and institutional contexts. Here teachers question and reflect upon why certain choices of practice were made. Reflection goes beyond questions of proficiency to how contexts influence teaching and learning. The third level introduces moral and ethical issues. Reflection at this level asks teachers to become "transformative intellectuals" (Giroux in Adler, 1991: 142). Teachers at this level should rise and examine ways in which schooling in general and their teaching specifically contribute or fail to contribute to a just and humane society. This level of critical reflection is related to what Wink (2000) defines as critical pedagogy. It is a level where the teacher will raise her critical horizon beyond the narrow concerns of the curriculum-delivery techniques to interrogate the context within which technical notions of efficiency and effectiveness get their meaning (Parker, 1997). Questioning that which is otherwise taken for granted, that is, not simply accepting things as they are (Adler, 1991). According to Nichols, *et al* (1997: 175) reflective inquiry becomes "critically oriented when traditions and conventions are examined in terms of underlying assumptions and agendas". Reflection undertaken without a critical perspective is unlikely to address the social, political and historical problems of any education system.

2.5. Summary.

We assume that the behavioural tendencies cannot be overcome in ten years, therefore, the shadow of the past hegemony and an authoritarian education system is still part of the Namibian education reform. As a result teaching and learning still resemble "a one-person show with a comatose audience" (Baylor, *et al*, not dated: 2). Teachers serve as pipelines and seek to transfer their thoughts and meanings to the passive learners (*ibid.*). However, Namibia has adopted a democratic alternative to these behavioural tendencies, the social constructivism. There is reason for change.

Particularly is it true that a society which not only changes but which has the ideal of such change as will improve it, will have different standards and methods of education from one which aims simply at the perpetuation of its own custom (Dewey in Wink, 2000: 166).

Constructivist theories require a shift in perspective for the teacher who stands in front of the classroom. She has to shift from someone who teaches to someone who facilitates and scaffolds learning and from “teaching by imposition to teaching by negotiation” (Bodner, *et al*, 2001: 3). She should not spend time telling learners what she thinks but asking them what they think about certain issues (Herron in Bodner, *et al*, 2001). According to Driver (in Bodner, *et al*, 2001), teachers who adopt the constructivist theory of knowledge exhibit the following behaviour:

- They question learners’ answers, whether they are right or wrong, to make sure that the same words are being used to describe the same phenomenon.
- They insist that learners explain the answers they give.
- They do not allow learners to use words or equations without explaining them.
- They encourage learners to reflect on their answers, which is an essential part of the learning process.

CHAPTER # 3.

RESEARCH METHODOLOGY.

3.1. Introduction.

In chapter two I discussed and explained the profound effect behaviourist theories have had on the teaching and learning situation. These are the theories that shaped education practice in South Africa and Namibia. At the same time I described the current constructivist theories and especially social constructivism that underpins the Namibian education system today. In this chapter the scene is set for a description of my research journey. The purpose was to collect data so as to establish whether there has been a shift from behaviouristic practice to a more democratic learner-centred social constructivist practice. I will also state the goals of the research. Thereafter I will discuss the research paradigm within which this research is placed and the reasons thereof. I will then talk about the suitability and limitations of the case study method that was used in the research. Thereafter I will discuss the sampling of the participants and justify the use of the research tools that were used in the gathering of data and the limitations of these tools. And lastly I will briefly state how the data was analysed.

3.2. The research goals.

The goals of this research are to:

- Develop an understanding of teachers' perception of the change in the teaching-learning process.
- Develop an understanding of teachers' epistemological and curriculum knowledge.

The intention was to learn from teachers' classroom practice about their practice and how they interpret this practice in view of the education reform in Namibia. In essence I was looking at how teaching and learning is affected, by resources (material and time), by teachers' subject knowledge, by the teachers' pedagogic and curriculum

knowledge and lastly by teachers' reflective capabilities in view of the new demands (Adler and Reed, 2000).

3.3. The research paradigm.

According to Bassey (1995) a research paradigm is a network of coherent ideas about the nature of the world and of the functions of researchers which, adhered to by a group of researchers, conditions the patterns of their thinking and underpins their research actions. This research project is underpinned by an interpretive research paradigm, which is:

The systematic analysis of socially meaningful action through the direct detailed observation of people in natural settings in order to arrive at understandings and interpretations of how people create and maintain their social worlds (Neuman, 1997: 68).

According to this definition interpretivists believe that there is no reality 'out there', which exists irrespective of people (Bassey, 1995: 13). It is a question of "people creating and maintaining realities". To be able to understand the teachers' perceptions of the teaching and learning process and their understanding of the epistemological underpinnings of the Namibian education reform, I was compelled to visit them in their schools (Allison, 1996). This gave me the opportunity to see things (reality) through their eyes (Neuman, 1997) and hear their voices and their stories. We always assume that people will have the same understanding as we do. But "people have seen, heard, or even touched the same physical object, yet come away with different meanings or interpretations of it" (Neuman, 1997: 70).

It is because of the above that I decided to apply a qualitative research approach. As expressed by Van den Berg (in Stones, 1988: 145), the interpretivist "can expect no greater results from the tools of a physicist than a painter can from the tools of a blacksmith". This means that the demands of the problem determine the approach and method. The data emphasises the qualities of entities and processes and meanings that are not experimentally examined or measured in terms of quantity or amount (Stake, 1995). Qualitative data involve documenting real events, recording what people say (with words, gestures, and tone), observing specific behaviours, and studying written

documents (Neuman, 1997). This then brings us to another distinguishing factor of qualitative research, that of subjectivity and bias. Qualitative research admits its subjective perception and biases of both the participants and the researcher (LeCompte and Preissle in Winegardner, not dated: 3). This calls for sensitivity to how the researcher's biases and subjectivity may affect the study and findings.

Another issue in qualitative research is sensitivity to the context and all the cues and nuances in it, including physical setting, people's overt and hidden agendas, verbal and non-verbal data (Winegardner, not dated: 3). This study is no exception because according to Brown (in Digisi *et al*, 1999: 247) "classrooms are complex environments and the relationship between teaching and learning is inherently confounded". Classroom environments in Namibia involve:

- The relationship between teaching and learning. As the teachers in this study are products of behaviourist theories, as already indicated in the literature chapter, we assume that their epistemological understanding and hence practice is influenced by these theories. According to McDermott (1993) results from research indicate that at all levels of instruction the difference between what is taught and what is learned is often greater than we realise. We normally assume that we know how learners learn and therefore this understanding informs our practice. Yet this teaching and learning as McDermott has indicated can be a mismatch.
- The interaction between teachers and curricula where teaching is still highly influenced by high stakes examinations and therefore teachers teach towards an external examination. The examination controls the curriculum in terms of what is taught and how it is taught (Wilmot, 2000).
- Teachers and the lesson observers. In this case the researcher and the second observer are advisory teachers and are still looked at by teachers as inspectors and not as advisors who are ready and willing to help (van Harmelen, 2001 a). The observers are also looked at as subject specialists who are supposed to know more than the teacher is and therefore the teacher feels inferior. This understanding will have an effect on how the teachers teach in the presence of these subject specialists. This then shows that the data from the teacher-lesson observer context cannot escape the power relations that exist within this context.

- Teachers and the regional mandates. Teachers are expected to finish syllabi within required time and the teacher's abilities are judged by examination results. There is therefore tremendous pressure to prove one's worth in terms of results (van Harmelen, not dated). This ultimately determines her growth in terms of promotion.

Therefore one should realise that the data gathered especially through interviews and lesson observations as well as through the teacher focus group are laden with the power issue. The power struggle will always be there. To disregard the intentionalities of the persons involved, on the assumption that experiences such as fear, anxieties, anticipations and respect are dependent on subjective inference and hence not amenable to verification through scientific measurement, is to extract from the situation such as this those characteristics which are uniquely human (Stones, 1988: 145). Teachers might have chosen to do or not to do or say something because of our presence. This is therefore a value-laden inquiry (Denzin and Lincoln, 2000).

My interpretation and description of the teachers' situation is an individual interpretation and should be treated as such.

Behind the research stands the personal biography of the researcher, who speaks from a particular class, gender, racial, cultural, and ethnic community perspective. He/she approaches the world with a set of ideas, a framework that specifies a set of questions that he or she then examines in specific ways (Denzin and Lincoln, 2000: 18).

This makes the issue of validity and reliability problematic. However in this particular research this problem was offset by the triangulation of different sources of data, which reduced the subjectivity and increased validity (Stake, 1995; Neuman, 1997). Secondly my presence in the subjects' own setting and the nature of our relationship and interactions, as described somewhere in this chapter, gives the data the needed rigour (Stones, 1988: 143).

Rigour in qualitative research derives from the researcher's presence, the nature of the interaction between researcher and participants, the triangulation of data, the interpretations of perceptions, and rich, thick description (Merriam in Winegardner, not dated: 9).

This is discussed at length in the data analysis section. This brings us to the method that was used in the research.

3.4. The case study method.

According to Allison (1996) case studies are in-depth studies of particular events, circumstances or situations that offer the prospect of revealing understandings of a kind, which might escape broader surveys. The problem of methodology cannot be considered in isolation, but only within the context of the phenomenon to be investigated and the problem aspect of that phenomenon (Giorgi in Stones, 1988). The interpretive paradigm that underpins this research, is central to the research design because it impacts on the manner in which my research question is studied and acts as a perspective that suggests particular methods of data collection and interpretation (Durrheim, 1999). Hence the case study method. In this qualitative enquiry I used an instrumental case study. This case study is termed instrumental because it helped me gain understanding into how Biology teachers perceived the learner-centred approach to teaching and learning and to view their epistemological and curriculum knowledge (Stake, 1995; Stake, 2000). It is the opposite of an intrinsic case study where the researcher is interested in a case not because by studying it she learns about other cases but because she wants to learn about that particular case. She has an intrinsic interest in the case, (Stake, 1995).

In this study my intention was to do a single case study of two schools only and I will justify this in the participant sampling section. I entered the scene with a sincere interest to learn and understand and was able to hear the teachers' particular stories in depth.

We would like to hear their stories. We may have reservations about some of the things the people [actors] tell us, just as they will question some of the things we will tell about them. But we enter the scene with a sincere interest in learning how they function in their ordinary pursuits and milieus and with a willingness to put aside many presumptions while we learn (Stake, 1995: 1).

Clearly then I had a personality or role that was thrust on me by the teachers and the learners over and above what I am officially employed to do. I was aware of this role

because it is not something that I could wish back into the bottle so to say (Gannaway, 1977).

3.4.1. Limitations of the case study method.

Case studies although very helpful methods for understanding phenomena, as I have argued above, have weaknesses.

- The difficulty in generalising the findings. “The real business of case study is particularisation and not generalisation” (Stake, 1995: 8). But together with other related cases one can begin to put together a holistic picture of the situation. Bassey (in Adler and Reed, 2000) calls them “fuzzy generalisations” while Stake (1995) calls them “naturalistic generalisations”. This is because they are context-specific and in harmony with the reader’s experience, and thus have a general basis for generalisation (Stake in Winegardner, not dated: 12).
- Although skillful data collection, analysis and reporting can reduce oversimplification or exaggeration of the situation, still these are inherent characteristics of case studies (Winegardner, not dated: 12).
- The third constraint is that of skill limitations and or bias on the part of the researcher. In case studies the researcher is a primary data gathering instrument, and all researchers are not equally good in observation and interviewing. Case studies are also dependent on the sensitivity and integrity of the investigator and naturally bias cannot be ruled out (Winegardner, not dated: 13).
- Although a comprehensive research design can reduce the time span, “the labour-intensiveness of the method”, expense and the time required to carry out the study should be recognised as characteristics of this research method (Winegardner, not dated: 13).

3.5. The research sample

Two schools participated in the research. Two Biology teachers, the principal and a group of Biology learners from each of the two schools were involved. As I have indicated above my unit of study is what Adler and Reed (2000: 199) call the ‘contextualised teacher’, or the ‘teacher-in-school’ the Biology teacher to be specific.

For some one to understand the contextualised teacher she has to move into and experience that teacher's context, this much has been said already. As the biological science advisory teacher [as stated in the context of the research] my understanding and feeling was and still is that I was better placed to study and be able to dig deeper into Biology teachers' context than a stranger would. This is made possible by long standing relationships that exist with the teachers concerned. I am well aware that this relationship may put my findings in doubt. However the methodological and investigator triangulation that I put in place reduces this subjectivity as I have mentioned elsewhere in this chapter (Cohen and Manion, 1998). "All research findings are someone's construction of reality" (Schon, 1983: 357) and therefore these findings should be interpreted in the same light.

- **Why the two schools?**

These are schools that are near my residence and I was able to walk to and from my home with relative ease. These schools are also near each other and this made it possible to shuttle in between and observe lessons at each school during the same day. So I based my selection on convenience. Secondly both schools offer Biology. Why two schools is another question that should be answered. Given the fact that I had to gather data in just over a month it was difficult for me to select a larger sample. After all case studies can be made of any phenomenon ranging from individual people to groups and situations (Allison, 1996). In addition I was looking for an in depth understanding of the situation and not a general survey. "It is vain to do with more what can be done with less" (William of Occam in Bassey, 1995:58).

- **Why principals?**

Each principal was interviewed so as to try and shed light on what kind of support teachers are getting in terms of the newly implemented learner-centred approach to teaching and learning. During this teething period the norm of collegiality and collaboration between teachers themselves, and teachers and the management in each school is vital. According to Rosenholtz; Oberg and Field (in Leithwood, 1993: 96) "norms of collaboration don't just simply happen". They do not spring spontaneously

out of teachers' natural respect and concerns for each other. The principal should start the engine running. Teachers should be encouraged consciously to reflect on their own practices, to share ideas about their instruction and try out new techniques in the classroom (refer to chapter two). The findings of the study will show how the two principals feel about this issue and what they are doing about it. It will also show another dimension, that of organisation and individual differences even from sister schools five hundred meters away from each other.

- **Why learners?**

Two groups of Biology learners were interviewed. Wink (2000) declares that the learners and the future matter. Education is meant for them we say and they should, therefore, be aware of their responsibilities towards their learning by setting objectives and organising their work (MEC, 1993: 11). Von Glasersfeld (1988: 328) calls this awareness by the learners as “operative knowledge”. I have already mentioned (chapter two) the discrepancy that exists between how teachers think learners learn and what the learners themselves say. The data in this research confirm the existence of this misconception. Both groups came up with issues that need to be addressed by the teachers if we are going to put rhetoric into practice. We need to give more consideration to how learners interpret their role and their definition of learning (Crebbin, 1999).

- **Why teachers?**

The ‘changes’, ‘reforms’ and ‘improvements’ impact primarily upon teachers. They are the people who have to implement them even when they believe, (through their professional experience) that these changes are inappropriate (Sikes, 1993). According to Dale; Walker and Barton (in Sikes, 1993) teachers are in a rather strange position of being simultaneously both the subject and the agent of change. For teachers in this study it is even worse because according to the data in this research there were “no proper consultations” (Principals 1 and 2) before the implementation of the reform. The teacher sample was composed of one male and three female teachers. I could not have chosen a better sample in the sense that it was not only

gender sensitive but also teaching experience sensitive. In this way I was able to look at, albeit in a small way, a sample of teachers who belong to different age categories, with different career and life experiences as well as belonging to gender groups. Secondly these teachers have attended several in-service training courses. These are things that make a total person and affect her/his interest in and response to innovation and change (Fullan and Hargreaves, 1993). I knew that in a small group (was supposed to be four teachers) firstly one Caprivian male teacher would let his voice be heard, and secondly two would dominate the discussion. This is a community where boys are supposed to take the lead in discussions because only they can become the future leaders. Women should respect and follow what men say. I therefore settled for one male teacher.

3.6. Ethical considerations.

The subjects of my inquiry are human beings who are entitled to privacy and dignity and therefore I was compelled to consider ethical concerns. These concerns revolved around four topics (Bassegy, 1995; Fontana and Frey, 2000):

- Informed consent. With the help of my supervisor letters were written to the schools concerned. They were addressed to the schools for the attention of the Biology teachers. A brief explanation about what the research is about was given. Unfortunately the schools were not requested to respond because of the time factor especially taking the question of distance and the resultant time it would take the schools to respond. However I was able to explain and apologise to the principals and the teachers when I arrived in the region. I made appointments and was allowed to enter the scene. I visited the schools again the following day to speak to the learners in grades ten and twelve, the grades I visited and interviewed. The program started on the third day.
- Right to privacy. The participants were informed during my first visit about the issue of anonymity and the confidentiality of the sources of the information. I have there given them code names. The first school (first in alphabetical order and not importance) is labeled A, the second B. The principal of A as P1 and of B as P2. The teachers from A as T1 and T2, and from B as T3 and T4. The group of learners from A as L1 and from B as L2.

- Protection from emotional harm. I followed the plan that was agreed upon with the teachers. Although I agree that I should have given P1 his space, as indicated under research limitations in chapter six, we had an agreement that I did not want to compromise.
- Respect for truth. The data that was collected represent the participants' voices and is put in such a way that the reader can hear them talking.

3.7. Data gathering tools.

Case study data collection is typically multi-method, usually involving interviewing, observing, and analysing documents (Winegardner, not dated: 7). Multiple sources of information are sought because no single source of information can be trusted to provide a comprehensive perspective. The researcher is able to validate and crosscheck findings by using multiple data sources (Patton in Winegardner, not dated: 7).

So complex and involved is the teaching-learning process in the context of the school that the single-method approach yields only limited and sometimes misleading data (Cohen and Manion, 1998: 238).

In my attempt to capture teaching and learning in their dynamic complexity, and in relation to the 'contextualised teacher' data was collected using the 'methodological triangulation'. Triangulation is the use of two or more methods of data collection in the study of some aspect of human behaviour (Cohen and Manion, 1998; Stake, 1995). Methodological triangulation then according to Stake (1995: 114) is the use of multiple approaches within a single study. It should be emphasised that this study was a search for additional interpretations rather than confirmation of a single meaning (Flick in Stake, 1995). Studying teacher behaviour from various angles gave me additional meanings that helped me understand the phenomenon better than a single method would. This methodology therefore suited the purpose of the research.

The following approaches or tools were used to collect data:

- 3.7.1. School inventories such as records of lesson observations; staff meeting, subject meeting, and cluster meeting minutes; the control of lesson preparations;
- 3.7.2. Classroom observation schedules;
- 3.7.3. Learners' written work such as class work, homework and tests;
- 3.7.4. Audiotaped interviews with principals, teachers and groups of learners;
- 3.7.5. Audiotaped workshop feedback with a focus group of three teachers.

It should be mentioned that I based the use of each of the above tools on what I consider as the main assumptions of social constructivist theory of which learner-centred approach to teaching and learning forms an important dimension (Taylor and Campbell-Williams, 1993; Brodie, 2000; Pomuti, 2000). This is the theory that underpins the Namibian education system (MEC, 1993) and van Harmelen (2001). This means that in each of the above approaches or tools I was carefully looking for the following indicators or assumptions of learner-centred education:

- Taking the learner's prior knowledge into consideration.
- Promoting collaborative as well as individual learning.
- The awareness of multiple roles the teacher plays [facilitating, mediating, scaffolding, co-learning, manager and team player].
- Curriculum and epistemological perceptions of a learner-centred approach.
- Reflecting and being reflexive practitioners.

3.7.1. School Inventories.

Quite often documents serve as substitutes for records of activity that the researcher could not observe directly (Stake, 1995). Documents can also tell us about intentions and aspirations of the subject (George, 2000). Unfortunately I was not able to find all the documents I wanted to peruse through especially at School A. The "gatekeepers" were not forthcoming with the information (Berg, 1998: 16). This is one of the problems one has to contend with in this kind of research, the respondents dictate and will always have an influence on the findings. The findings in this regard refer to School B.

School A does not seem to be organised enough and I did not get most of the documents I wanted. According to what the teachers told me they seem to lose documents that should be filed. As far as lesson observations are concerned the principal [P1] told me that this is done: “Where it is confirmed that the teacher is on the right track then it is ok but where there are problems, there should be as many class visits as possible”. I therefore assume that the Biology teachers who participated in this research might be “on the right track” then. I was able to go through one teacher’s [T1] preparation book. The second teacher [T2] told me that he does not believe in keeping records of lesson preparations. He has been teaching the same subject for over seventeen years and therefore knows what to do. Is teaching routine work? I do not think so. Will each group of learners every year ask the same questions, have the same ‘zones of proximal development’? I am not convinced. Not in a constructivist classroom I have to say. I fought the impulse of going through the other teachers’ files to see whether something is being done in the other subjects. As this was not part of the initial agreement and it was not my intention to find faults, I let it lie. I had to stick to the ethics (Denzin and Lincoln, 2000).

Generally the documents that I was able to see were very illuminating. Unfortunately heads of departments instead of the principals (I interviewed) do lesson observations and the control of preparation books. Therefore I was unable to make connections between what the principals were saying and practice. But there is enough evidence from staff meeting minutes (especially from School B) to enable me to get an impression, albeit in a small way, of what the principals’ perceptions of the education reform are. The consistencies in comments the heads of departments are giving the teachers also suggest that the principal (School B) as head of the school is aware and happy with what is happening. This however remains an assumption.

3.7.2. Classroom observation schedules.

Observation is an excellent way of gathering data directly rather than relying on what people may report as happening (George, 2000). Each Biology teacher was supposed, according to the plan, to be class visited for five consecutive lessons. The intention was to have a deeper understanding of how teachers teach. How they build bridges

between the lessons. How and when they involve the learners in the lesson. And how they deal with issues that emerge from discussions during lessons. These are some of the indicators of learner-centred teaching and learning. Unfortunately I was unable to carry out the plan. This issue will be discussed under research constraints in chapter six.

It is important to mention that during my class visits [apart from Lesson 2 of T2], I was blessed to have the company of the senior advisory teacher [who is labeled as the second observer or observer 2 in this study]. He is the head of the regional advisory services. He also recorded his observations on each lesson. The understanding is that this “investigator triangulation” would improve the validity of the collected data (Denzin in Cohen and Manion, 1998). We had a general discussion prior to the visits. This was meant to inform him about the research study in general and lesson observations (learner-centred indicators as mentioned already) in particular as well as to acquaint him with the use of the lesson observation schedules. We did not however have ‘after lesson observation discussions’ as we felt that this would jeopardise our individual assessments or observations because we would be hunting for consensus instead of looking at the real issues as they unfold. We did not talk to the teachers after each lesson either because we did not want to preempt what would be discussed in the workshop. The data we collected reveals a significant similarity (refer to Appendix 1) and makes me feel confident about the validity of the data (Stake, 1995; Smith, 1998). The teachers were observed on an average of three consecutive lessons. In this way (as already mentioned above) we were able to see whether the teacher takes prior knowledge into consideration in her teaching. Secondly it made it easier for us to see whether the teacher could reflect on her teaching as well as show whether she could do the necessary changes after the lesson or during the lesson, that is the ability to reflect-in action (Schon, 1983). Thirdly to see whether the teachers could facilitate and scaffold. All are important indicators of learner-centred lessons. We encountered problems here in that some lessons were not connected especially with regard to T3’s revision lessons. It was difficult to develop a pattern of how she thinks about her thinking. The data is discussed in the later chapters and the lesson observation schedules are attached in Appendix 1.

3.7.3. Learners' written work (class work, homework and tests).

The data collected in this area is exclusively from School B. I was able to peruse through a sample of ten exercise books per teacher. Grade twelve for teacher (T3) and Grade ten for teacher (T4). I feel that this is enough to give me a good impression of what is happening with regard to learner-centred teaching and learning. The second observer did not participate in this exercise, as it was not part of the plan. It would have been interesting to have his opinion though. I looked at the amount of work done, the quality and depth of the assignments and tests, and how these were controlled.

3.7.4. Audiotapped semi-structured interviews.

My interviews were face to face interviews in which I set out to elicit from my subjects information or opinion on learner-centred education and the education reform in general (Allison, 1996: 25). In this research I used a semi-structured interview. According to Wragg (in Smith, 1998: 39), a semi-structured interview “allows respondents to express themselves at some length, but offers enough shape to prevent aimless rumbling”. This is appropriate with my interpretive paradigm and methodology.

Semi-structured interview schedules with open-ended questions were prepared in advance. That is one interview schedule for each of the respondents [the principals; the teachers and groups of learners]. The semi-structured interviews enabled me to elicit more elaborate, in-depth responses from the interviewees (Allison, 1996). I was also able to cover a range of topics in a short space of time. Although I was not able to follow the questions as they appear on each schedule (it depended on the answers from the respondents), the schedules enabled me to remain focused. I was able to explain or rephrase some of my questions to make it easier for the interviewees to understand. This was very important because I realised during the interviews that some of the questions I thought would be easy to understand proved difficult. Sometimes I had to rephrase the question two to three times before I could get a relevant answer. For example, a question like, “What kind of lesson do you enjoy

most, and why?” Both groups of learners understood it to mean which topic they enjoy most. Certainly piloting the interview schedules before the interviews could have helped me reformulate vague questions. I am glad it was not a questionnaire because I would have run into trouble. Rothwell (1996: 95) calls it “doing it at your own peril”. But still interviews have other weaknesses. The power issue that I have mentioned earlier in the chapter is very relevant here. As O’Sullivan *et al* (1996) rightly put it, that the interviewee can exaggerate and try too hard to give the interviewer what she thinks he wants. The other issue is that during transcribing misunderstandings [especially where the tape recorder is not powerful enough] on the part of the researcher can occur. I hope I was able to get what the interviews were saying because I played the cassettes a number of times. As for teacher 3 and 4, I was not able to follow the conversation because the recording is very bad. This is the reason why I do not have data on their interviews. This is highlighted under limitations in chapter six.

I had individual interviews with the four teachers. Each one of them chose his or her own suitable day and time. I had to fit these needs into my schedule. The first two were interviewed on two different days and I used the school tape recorder in the interview. T3 and T4 were interviewed on the same morning but during different time slots. After the teacher interviews I interviewed the principal [P2] of School B the following day. After a struggle I managed to have an interview with the principal [P1] of School A. This was after three failed appointments to be specific – each time we agreed on a date and time but he failed to arrive.

Thereafter I interviewed a group of learners [L2] from School B and then [L1] from School A. Refer to Appendix for the interview schedule. Each group had five members as planned in the research proposal. Each group was small enough for me to control and ensure individual participation and big enough to have a good discussion. They were all mixed groups in terms of gender [representative school samples] and were selected by their teachers. The researcher in consultation with the teachers concerned made the arrangements for the time and dates for each interview. What I found a bit difficult during the interviews was that in most cases I was not able to follow on individual answers, as I wanted. A fellow learner for instance, would answer a follow-up question instead. I felt that if I push them more they might

become defensive and that could defeat the purpose of whole exercise (Cohen and Manion, 1998). The interviews were conducted in English, as this is the official language in Namibia and because the learners themselves chose to. We were able to have good discussions although English is actually a third language for everyone in the region. Each group knew who I am as I was introduced to them long before the interviews. I have to admit that arranging for the interviews and conducting them [apart from P1] did not prove to be a problem as I anticipated. Perhaps the reasons are firstly that the teachers and I knew each other well. Secondly they seem to have understood and liked the purpose of the research as well. And thirdly because they made the arrangements and decided on the 'when' and 'where' themselves. The difficulties that I encountered with P1 are discussed in the research constraints in chapter six.

3.7.5. Audiotapped workshop feedback with a focus group of teachers.

I had prepared a schedule of questions based on their understanding and application of the learner-centred approach to teaching and learning in advance. And therefore the feedback part of this session was conducted in the form of a semi-structured interview and audiotapped, as I wanted to capture their deliberations through their own voices. First typed summaries [a combination of observer 2 observations and mine] of two observed lessons from each teacher and copies of the schedule of questions were given to the teachers to discuss in a small group. Thereafter they gave feedback on each lesson. During the feedback additional questions were asked to guide and help clarify some issues. The teachers who participated in both the interview and lesson observation sessions [apart from T4] participated in the workshop. Unfortunately teacher [T4] remembered that she had planned for a practical activity with her learners on the eve of the workshop and could not attend. The views expressed in the data from this session are not on her lessons. We felt that it was unfair to talk about her lessons in her absence. This is another gap in this research that could have been bridged. However, it was not under my control.

The purpose of the workshop was to have the teachers discuss each other's lessons in terms of: reflecting on their own lessons and suggest ways they can improve such lessons; the extent to which these lessons were achieving goals of a learner-centred

education. In the end this come-together served three purposes in a way. Firstly I as researcher was able to develop an understanding of how the teachers think about their teaching, that is, I was able to collect my research data. Secondly I could see that discussions like this, where teachers share experiences, are indispensable for teacher development (I was learning in the process). Thirdly the teachers were able to learn as well.

“Like at times we just prepare. But like her lesson we also learn it is nice and easier to link up lessons. And also I may think my lesson is perfect yet not knowing that there is some loop holes in my own” [T3].

“I got something in this session. More especially on the application side of the lesson. I think I must also teach my learners to relate what they learn to real life” [T1].

How was it conducted?

Two lessons each for T1 and T2 [from School A] and T3 [from School B] were discussed. In attendance were observer 2 and AM. AM was an advisor in the Life Science Project. This was a project that spearheaded the education reform in Namibia. We have been rendering advisory services to teachers together for the past seven years and she is therefore well known to the current crop of Biology teachers. I invited her so that she could lend her voice to the discussion. Her questions to the teachers helped to elicit answers that I alone could not have done. The second observer (who was supposed to be a non-participating observer) commented, in written form, on how I and AM interacted with the teachers in trying to milk information from them as per workshop schedule. It was a lively encounter that ran over two hours and could have lasted longer if we had time. Observer 2 could not resist the temptation of vocally getting involved in the discussion, especially on inheritance and reproduction. Unfortunately I did not use observer 2’s analysis of the discussion in my data analysis. I felt that he did not analyse the perceptions of the teachers on what learner-centred education is and how knowledge is acquired as agreed [he had a copy of the workshop schedule for reference] but made a summary of each lesson instead [refer to Appendix 3 b]. It was an unfortunate misunderstanding. But I would have loved to see his comments because this could have given me an additional understanding of the situation.

In sessions like this there are always tensions among teachers themselves and between the teachers and the 'others'. It is not an every day occurrence and perhaps I can understand why T1 was not happy and free to express her feelings on the lessons. Perhaps we should not have started with her lessons. I could see that she felt insecure despite AM and me trying our best to involve her. But how was I supposed to know? She looked confident enough during my interview and I could see her confidence growing during the lesson observations. This gave T2 [the male teacher] an opportunity to dominate the discussion. This and other problem areas are discussed under the 'constraints' in chapter six.

3.8. Data analysis.

This study yielded as expected a huge amount of data in the form of descriptions (Neuman, 1997). Research of this nature does not have a particular moment when data analysis begins. It is a matter of giving meaning to first impressions and final compilations (Stake, 1995). This meant that I had to progressively focus and organise data into categories and themes while gathering. An interpretational data analysis method was used. This is a process for close examination of case study data in order to find constructs, themes, and patterns (Winegardner, not dated: 7). First the data was arranged under the following themes: interviews; lesson observation; teacher-focus group [workshop]; learners' written work; and school inventories. Secondly interviews were transcribed and then together with the rest of the data typed. After typing all the data it was analysed on the basis of the main assumptions of social constructivist theory as mentioned under the data gathering tools in this chapter. I will call them criteria or yardsticks as they were used to gauge and get insights into what teachers say and are able to do with regard to the goals of the research.

All the identified themes were put under each criterion and tossed to and fro to find relationships [similarities and differences], and to see which issues recur through out the data. What is the relationship between what is being said and actually done? What hinders putting rhetoric into practice? Why do teachers and learners come to say what they say? What do they need to know and understand to be able to make such statements? Why do teachers do what they do? I essentially tried to take the data apart

(Stake, 1995). The above questions address the issue of triangulation of the data and bring to light not only what is happening in schools, but also the importance of looking at an issue from different fronts and angles. These are some of the questions that helped me understand and structure the data as it is structured and discussed in chapters four and five. I also tried wherever possible to bring the voices of the teachers and the learners to bear on the data by quoting directly. This makes the data in a way to speak for itself so that the reader can get a feel of what the participants were saying.

I cannot make generalisations from the findings of this study. But a reference to similar studies is done in chapter six. It was not my intention to produce general statements any way otherwise I would have used the survey method where I would have probably addressed myself to the silence of the many rather than to the words of a few teachers and learners. I agree that:

The whole process of data analysis is to enable the researcher to understand the case as to make his assertions and at the same time provide readers with good raw materials so that they make their own naturalistic generalisations (Stake, 1995: 85 and 101).

CHAPTER # 4.

DATA ANALYSIS.

4.1. Introduction.

In our quest to analyse and interpret data we try to isolate the active chemical that we feel will give meaning to whatever we are studying. Unfortunately in this same process we lose some of the important and natural parts of the *holon* (Wilber, 1995: 14). “...No aspect of a structure can be altered without affecting the entire structure; each whole contains parts and is itself part of a larger whole” (Wilber, 1995: 14). The isolated chemical cannot exist alone, and it cannot alone give us the real meaning of the situation. The active chemical and its ‘tidbits’ form the context, which is so critical in understanding what is happening. “Without reference to the context of a phenomenon there can be little clarity regarding its inherent psychological meaningfulness” (Stones, 1988: 148). In this data analysis I will try as far as possible to include the tidbits as well. I will also try and bracket personal preconceptions and judgements and to the fullest extent possible, remain faithful to the data (Stones, 1988).

In this study my intention, as stated in chapter one, is to try and understand the education reform in Namibia better. I believe that this is a worthwhile goal.

...The simple idea that where there is a problem the job of the researcher is to find a solution, is usually unrealistic. The research purpose is more likely to be to formulate and try out ways in which the problem may be understood and so be alleviated or the difficulty reduced (Bassegy, 1995: 55).

4.2. The data analysis procedure.

The data is analysed through what I would consider as some of the assumptions of social constructivist theory with a learner-centred approach to teaching and learning as a model (Taylor and Campbell-Williams, 1993; Brodie, 2000; Pomuti, 2000). This is the theory that underpins the Namibian education reform (MEC, 1993; van Harmelen 2001).

I will call these assumptions criteria because they are used as yardsticks for giving insights into what teachers who participated in this research are saying and doing. The criteria will be put into blocks and in bold so that we can easily identify them from the rest of the information. The data from each research tool (as mentioned in chapter three) will be analysed through these criteria. Wherever possible I will use the phrases that the respondents themselves have used so that the data can in a way speak for itself (Stones, 1988). These phrases will be put in Italics.

The criteria that are used have been discussed in chapter two. I give a brief description of each here.

- Taking the learner's prior knowledge into consideration. Prior knowledge is understood to mean the knowledge, experiences (from home or previous lessons and other experiences), skills, myths, taboos and beliefs the learner brings to the classroom (Brooks and Brooks, 1993).
- The ability of the teacher to promote collaborative as well as individual learning. The classroom should provide neutral zones where learners exchange their personal views and test them against the ideas of others. At the same time individual activities should also be provided so as to allow learners to work at their own pace and be able to show what they can do as individuals (Brooks and Brooks, 1993; Johnson and Johnson, 1994).
- Awareness of the multiple roles the teacher plays (facilitator, mediator, scaffolder, co-learner, manager and team player). In a learner-centred approach the teacher moves "from teaching by imposition to teaching by negotiation" and therefore becomes a co-learner (Bodner, *et al* 2001: 3). The teacher also encourages and guides the learners to reflect and explain their answers and she therefore becomes a facilitator and scaffolder (*ibid.*). The teacher should break her cocoon and communicate with fellow teachers. Team-teaching opportunities create the need to plan and carry out instruction with colleagues (Rosenholtz in Leithwood, 1993).
- The teacher's curriculum and epistemological perceptions of a learner-centred approach. Constructivism's central idea is that human learning is constructed

(SEDLetter, 1996). Learners construct new knowledge using what they already know and by being mentally and physically engaged in the learning process (Hein, 1991). Therefore creating a classroom culture where learners can explore, make mistakes and explain their thinking is seen as part of learner-centred pedagogy (Brodie, 2000).

- The teacher's ability to reflect and be a reflexive practitioner. Teachers and learners have to grapple with real questions that emerge directly from their work and then effect changes or take action and thus become reflexive practitioners (van Harmelen, not dated; Newman, 1998). This understanding is related to what Schon (1983) calls reflection-in-action (refer to chapter two).

4.3. The data analysis.

The data is analysed according to the tools that were used for collecting the data, that is, interviews, lesson observations, the workshop, and lastly school inventory. The data is arranged in the following order:

- Each Biology teacher's interview responses (where available) are compared with a commentary of her/his lessons as well as his/her comments from the workshop (where available). Teacher 3 and Teacher 4's responses on interviews do not form part of this data (refer to chapter six). It is also important to mention that Teacher 4 did not attend the workshop and therefore her voice is missing from the workshop data.
- Secondly the learners' responses on the teaching at the two schools.
- Thirdly what the following documents reveal: lesson observations by heads of departments; staff and subject meeting minutes; tests and learners' written work.
- Fourthly the two principals' understanding of why and how the reform was introduced, and their perception of the learner-centred approach.

Teachers will be coded as T, school principals P and groups of learners as L.

4.3.1. The Biology teachers.

4.3.1.1. Teacher 1 (T1).

* The interview .

Taking the learner's prior knowledge into consideration

How do you teach then?

Normally the way I teach myself, I first introduce the topic. From there I give them topics to discuss in their groups. After all they give me feedback. From there I give a review of the lesson. I revise what they said and then tell them the right things. At the end I ask questions.

It seems that the teacher considers prior knowledge in that she allows learners to discuss before giving their feedback. Perhaps this suggests that during the discussions prior knowledge will be used. Revising feedback also suggests that what comes out of the discussions is deemed important.

Promoting collaborative as well as individual learning.

How often do you teach in a learner-centred way?

Myself even my class is arranged according to groups. So every time I give my learners some topics to do. But when I see that I am a little bit behind time, I give them work. One learner from each group must give feedback. Sometimes two learners from each group to make the work to be a little bit faster.

The teacher recognises collaborative work by letting learners work in-groups. But there is no evidence to suggest that individual learning is recognised apart from individual reporting on group feedback. Group work is used to speed up the completion of content rather than enhancing learning.

Awareness of multiple roles the teacher plays (as facilitator, mediator, scaffolder, co-learner, researcher, manager and team player).

...Even my class is arranged according to groups. ...They are able to ask questions on the topic and other learners can help. And at the end I help them.

...I find that more especially those intelligent learners are learning something. Even those slow ones are really getting something.

What do you want to put in place to enable you to teacher better?

I wanted ...insect nets. ...Test tubes are not enough. What is there is just a skeleton.

What have you done about it?

I have done nothing. I have just used textbooks and pamphlets from other different books to make some copies.

In summary the teacher realises that learners can learn from each other as well as from the teacher. There is a place for both fast and slow learners. However she does not seem to realise that it is her responsibility to make resources available so that learning and teaching can occur. She does not realise that she is the manager of her subject as well as part of the teaching team.

The teacher's curriculum and epistemological perceptions of the learner-centred approach.

How was the education reform introduced?

...In a good way even though when it started there were no textbooks. There were just...syllabuses and schemes of work. ...But later on a textbook for each grade was provided.

Why do you think the reform was necessary?

This was necessary because in the past teachers used to struggle. But in this new transition learners search for information or they discuss and then they present to you as the teacher and at the end you make conclusions together with the learners. In the past it was just teacher talking. So now learners learn a lot...these days learners ...enjoy talking. These days we are trying to make learners to be good decision-makers. They decide on what they are given. ...Must know the objective of the

lesson...apply knowledge they got out of the lesson outside the environment. ...Some of these learners are going to be doctors and nurses. They must know that this is part of their lives.

Learner-centred way is slow...you stick to it too much you will not finish the syllabus in time...we are not provided with double periods. ...Unless you come during the afternoons again and teach. [And] It means that most of the time learners are participating in that lesson. ...the teacher facilitating or supervising. ...I give my learners...topics to do...to be a little bit faster.

But is teacher talking bad?

It is bad. I always use question and answer method. ...I inform them in the introduction part...this topic is about this and that.

She seems to understand that in the learner-centred approach teacher responsibility is replaced by learner responsibility. It has to be a joint effort. She also equates teacher talking with teacher telling. Teacher talking by giving guidance, encouragement and support to learners is part of the learner-centred approach to teaching and learning. Teacher telling on the other hand does not encourage independent thinking and seems to give an impression that 'what I am telling you is a fact and the only fact'. Generally she does not seem to have an understanding of what the approach is all about.

Reflecting and being reflexive practitioners.

What is reflective teaching? What does it mean to you?

I have heard about that. I think may be reflecting what is taught in class. Showing what is taught in class. Learners should show to other learners and to the community.

How do you reflect on your work? [Follow up].

I tell my learners what is necessary. I teach what is relevant not something which is irrelevant to the subject or topic.

In summary the teacher does not understand the concept.

In conclusion the interview is revealing the following:

- She seems to recognise prior knowledge although the evidence is not convincing.
- The teacher recognises collaborative work by letting learners work in-groups. But there is no evidence to suggest that individual learning is recognised apart from individual reporting on group feedback. Group work is firstly used to speed up the completion of content rather than enhancing learning. Secondly it is used to discuss topics that are given to the learners.
- She recognises that learners can learn from each other and from the teacher. But she does not seem to realise that she is the manager of her subject.
- She does not seem to have an understanding of what a learner-centred approach is. The teacher [as are learners] is still responsible for what happens in the teaching and learning process. Teacher talking is not teacher telling.
- The teacher does not understand what reflection means. Yet she was able to reflect on the difficulties of the learner-centred approach. She was also able to reflect on how the reform was introduced. She identified what resources she needed to teach better but she does not do anything about it.

How is the above evidence put into practice? This is the question we are going to address under lesson observations, which is the next phase in our endeavour to understand T1. A commentary is given on the lessons and the lesson schedules are attached as Appendix 1.

*** Lesson observations.**

T1 was visited four times. What follows is a commentary of her lessons.

The lessons were generally dealing with human reproduction.

Taking learner's prior knowledge into consideration
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There is no evidence of recognition of prior knowledge in Lesson 1 and 2. In Lesson 3 she asked the learners a few questions on the previous lesson. From the learners' answers I could see how ineffective the previous lessons were. The learners were confusing concepts like co-dominance, inherited characteristics and genes. However

the teacher does not seem to realise this, at least for now. It would be interesting to see the next lesson.

“From your own experience what is family planning?” she started Lesson 4. She was also interested in knowing the learners’ experience of traditional contraceptives.

In summary she showed consideration of prior knowledge in Lesson 4 but there was little evidence of this in Lesson 3.

Promoting collaborative as well as individual learning

The teacher concentrates more on group work as shown by Lessons 1, 2 and 3. However the time given for group discussions is very little for meaningful discussions to take place. Ten minutes in Lesson 1; five in Lesson 2 and ten minutes in Lesson 3. In Lesson 4 there was an open class discussion. She asked individual learners to give their opinions on what family planning is. Learners were talking freely and raising interesting questions but the teacher did not give them enough time to really learn from each other. The learners were willing to discuss religion and contraceptives, and the difference between traditional and modern contraceptives.

In summary group work seems to be something in fashion rather than an important strategy in teaching and learning. Time allocated to group work is not encouraging by any standards.

The awareness of multiple roles the teacher plays (facilitator, mediator, scaffolding, co-learner, manager and team player).

There is evidence of facilitation but not scaffolding in Lessons 1-3. In Lesson 4 there was evidence of both facilitation and scaffolding. She was asking guiding questions and also listening to the learners’ responses. Emergent issues were not however addressed. What I could not conclude was whether the teacher felt uncomfortable with the topic itself or our presence. Coming from this area myself I know that this is a sensitive topic. A female who talks freely about it is not respected. This emphasises the importance of context in research (Lockett, 1996).

In summary there is evidence of facilitation but very little scaffolding. Learners are not challenged as much as they should be. Issues that emerge from group discussions are not addressed.

Curriculum and epistemological perceptions of the learner-centred approach.

The teacher concentrated on group work yet very little from group feedback was discussed. She does not seem to understand the purpose of group work. Secondly most of the examples given by the learners and the teacher come from the textbook. This probably shows a lack of subject knowledge. The fact that the teacher is not focused and is covering a lot of content instead of focusing on meaning making suggests that she is operating from a wrong understanding of learner-centred epistemology. Teaching towards the completion of the syllabus in such serious topics, topics that have relevance to the learners' lives shows a lack of epistemological understanding. Perhaps she is under pressure from the demands of the high stakes examination

In summary she does not address issues that emerge from lesson discussions. Connections between classroom discussions and the real world are not made. She covers a lot of subject matter in one lesson and seems to rely on the textbook.

Reflective and being reflexive practitioners.

There is no indication of her thinking about her lesson at all. The setting in Lesson 4 was different from the other lessons. It was a much more open classroom discussion. The class was willing to discuss issues as they raised a number of issues.

In summary there is no evidence to suggest that the teacher understands and recognises reflection. Although there was a different setting in Lesson 4 this does not suggest a deliberate effort on reflection.

In conclusion the lesson observations are revealing the following:

- Evidence of taking prior knowledge into consideration is negligible.
- Group work is used without understanding its importance.
- There is evidence of facilitation but not scaffolding.
- She does not address issues that emerge from lesson discussions. Connections between classroom discussions and the real world are not made. She covers a lot of subject matter in one lesson and seems to rely on the textbook.
- No evidence to suggest that she understands what reflection is.

*** The workshop.**

The procedure on how the workshop was run is described in chapter three.

Taking the learner's prior knowledge into consideration.

There is no evidence. She did not say much.

Promoting collaborative as well as individual learning.

There is no evidence.

Awareness of multiple roles the teacher plays (facilitator, mediator, scaffolding, co-learner, manager and team player).

But do you feel that it is necessary for teachers to have time to discuss issues?

[follow-up again]

Yes it should be.

In summary there is no evidence to make conclusions.

Curriculum and epistemological perceptions of a learner-centred approach.

I can see that T2 is talking about releasing of sperm cells, is that not reproduction? May be the problem is referring to the textbook. Because in the textbook there are those graphs showing the male and female reproductive cells directly to fertilisation. They even indicate that there is meiosis taking place in the gametes so they split and then fertilisation must appear. Now XX is a girl and XY is a boy.

In summary this little information suggests that she teaches from the textbook only.

Reflecting and being reflexive practitioners.

I think as the topic indicates that it is chromosomes and genes. I do not think you can take forty minutes just concentrating on chromosomes and genes. However next time I will take the topics in a logical way.

...Could you have implemented some of this knowledge in your lesson?

I used colour and height. I even asked about the complexion of their parents and how they might have inherited that. That is what I was giving them as example.

Have you learnt anything out of this session?

I got something in this session. More especially on the application side of the lesson. I think I must also teach my learners to relate what they learn to real life.

This evidence suggests that the teacher she could reflect if she made an effort. And perhaps it also shows the power and the importance of sharing experiences. In such meetings teachers are reminded about some elements of their work.

In conclusion the discussion is revealing the following:

- The teacher's subject knowledge is suspect because she seems to have problems in using sources of information. She relies on the textbook whose contents are not questioned.

- The teacher could reflect if she made an effort. It also reveals that reflection may be associated with subject knowledge. Therefore she needs support from fellow teachers.

4.3.1.2. Teacher 2 (T2)

* The interview.

Taking the learner's prior knowledge into consideration

How comfortable are you in teaching in a learner-centred way?

I have no problems with that. What I need only needs that I give the topics to the learners to do their preparations so that they can now come and contribute in the activities. So that they can steer the learning process. But if arrangements have not been made and books are not available they might not be able to contribute to such a process of learning. So if I say the learning now should go over to them, since they had no prior knowledge about the issue, they would be silent.

So what do you do? (Follow up).

What do I do at that stage? I should have done my homework. Today, tomorrow we are going to talk about this and I know that everyone has a book. And we say ok what did we pick out from that and then we are going to do this. Set an experiment the way you think we have it done and we all contribute to doing that [not audible]. If we do that we might not get the results. We might also do it in another way. So in short I will be there, going around to see if they had already picked out the basics of what they have learnt. And now trying to practice what they have learnt.

The teacher recognises prior knowledge but seems to understand prior knowledge as the knowledge that comes from the Biology textbook only. Perhaps he does not realise that books, other previous lessons in Biology or other subjects, the community, etc. all play a role in giving the learner experiences that she brings along to the classroom.

Promoting collaborative as well as individual learning.

There could be several reasons why the learner might not want to participate. He might not have been prepared; he might have language problems; he might be placed in a different grouping...So I should have no single sweeping method until I am able to examine the causes of the learner not to participate.

The evidence is not convincing enough to judge whether the teacher recognises collaborative as well as individual learning. However he seems to be interested in the wellbeing of the learner. He mentions the learner belonging to a different group, which might suggest that he recognises group work.

Awareness of multiple roles the teacher plays (as facilitator, mediator, scaffolder, co-learner, researcher, manager and team player).

To say today ...they are going to do the activities, and I am going to sit at the back of the class and watch them do what they do and follow them about might not work. You might sometimes interrupt them at a point and give them guidance. ...And a little bit of flexibility to be allowed to accommodate the learners because they might not progress the way you might have wanted. ...Then you come back to them, “don’t forget guys we have a target to meet”. ...I would be there, going around to see if they had already picked out the basics of what they have learnt.

There is a partnership with the languages because English is the only medium in which all of those books are written...then along with the English teacher remedial work could be set. I can cite an example of a topic on the environment. ...They answered it in an essay form so when I came to teach this one, words like conservation, extinct...became clear to them.

There is realisation that it is the teacher’s responsibility to guide learners during the lesson. There is also an understanding that one cannot do it alone, one needs the help of other teachers in scaffolding which can be done through remedial work.

The teacher's curriculum and epistemological perceptions of the learner-centred approach.

How do you understand learner-centred teaching?

Look at it from the way it is coined, "learner-centred". So it means the learner is...taking the center of the learning process. ...The learners are doing and the teacher...follows what learners are doing. This involves learners themselves doing the preparations ...taking part actively in the process, resources being available to the learners to do exactly the way they wanted. A little...flexibility...allowed to accommodate the learners because they might not progress the way you might have wanted. At a point you demonstrate and a point they have to do the activity themselves. You might sometimes have to interrupt them at a point and give them guidance and that is the period of instruction. It might come in the beginning...in the middle or at the end. ...At a point you end up explaining certain things.

. ...In the old system rote learning, recall of facts and very little application of knowledge were emphasised. ...Mostly it was ability to recall facts, ability to identify facts. ...More subject areas were covered rather than the introduction of principles of reasoning and application of knowledge to life. ...Now the...applications of that knowledge to life, reflecting all the subject content as...having wider repercussions on you. If learner-centred has to go on some activities will go slow. If there is enough time for that topic you allow the learners to explore the opportunities...and go far into researching a project...into other things. ...Flexibility has to come in.

What is your understanding of a good lesson?

A good lesson depends on what aims were set out in the beginning of the lesson and at the end whether those aims have been achieved. There is a way of finding out whether...the lesson had a meaning. Continuously within the lesson. ...At the end of the lesson. ...From a few evaluative questions.

Generally there is evidence to suggest that the teacher understands what the learner-centred approach is.

Reflecting and being reflexive practitioners.

What is reflective teaching? What does it mean to you?

To reflect on something is to look back on it. And when you look back on something you try to see how did it go. You are now trying to assess, evaluate, to identify those areas that went well and those...that did not go well. ...And what would you do next for those areas that went well ...and those ...that did not go well. So it is kind of looking back on what happened in the class and that gives you an idea of what will happen next in the next class. Yesterday I forgot to use the word network. I only said blood capillaries. When I went back to the flat then I discovered that no I shouldn't have said blood vessels only, I should have said network of blood capillaries. ...So this morning I came back and thought this one is necessary and "you add". Then they added.

What is your opinion on how the education reform was introduced? Was it necessary?
...The old system was based on the fact that people were different so they should be introduced to different systems of education. ...Most people were not allowed into the sciences. ...Were offered service courses...meant to serve the masters. So the reform was necessary to make the system of education...uniform. So that all people ...can have a sense of belonging, one policy and one system of assessment. Teacher preparedness was...delayed. Some teachers had political ideas...resisted change to a degree, but...gradually embraced...change.

There is evidence to suggest that the teacher knows what reflection is especially at the classroom level. He was also able to reflect on how the reform was introduced and was able to compare the old and the new system in terms of what kind of knowledge they emphasise.

In conclusion the interview is revealing the following:

- The teacher recognises prior knowledge but seems to understand prior knowledge as the knowledge that comes from the Biology textbook only.
- The evidence is not convincing enough to judge whether the teacher recognises collaborative as well as individual learning. However he seems to be interested in

the well being of learners. He mentions the “learner belonging to a different group”, which might suggest that he recognises group work.

- There is realisation that it is the teacher’s responsibility to guide learners during the lesson. There is also an understanding that one cannot do it alone, one needs the help of other teachers in scaffolding which can be through remedial work.
- Generally there is evidence to suggest that the teacher understands what the learner-centred approach is.
- There is evidence to suggest that the teacher knows what reflection is especially at the classroom level. He was also able to reflect on how the reform was introduced and was able to compare the old and the new system in terms of what kind of knowledge they emphasise.

*** Lesson observations.**

T2 was class visited three times and what follows is a commentary of his lessons.

The lessons were based on the transportation of water in plants.

Taking the learner’s prior knowledge into consideration

In Lesson 1 the teacher revised the previous lesson on osmosis by leading a question and answer session. Apart from this there is no evidence that he considers learners’ prior knowledge in the other two lessons that followed.

In summary the teacher does not seem to take prior knowledge into consideration. He relies on telling.

Promoting collaborative as well as individual learning

In Lesson 1 learners were given individual homework. In Lesson 2 the teacher allowed learners space to choose to work as individuals, pairs or groups. They were allowed to move around and discuss over what they were doing. They invited each other and the teacher to see their observations and they were willing to explain what they were doing and observing. Generally it was a lesson where both collaborative

and individual learning were recognised. In Lesson 3 learners worked in one big group [ten learners]. They were discussing and arguing and making suggestions on what could be the problem.

In summary apart from lesson 1 where the evidence suggests individual work only, the teacher generally promotes both collaborative and individual learning.

Awareness of multiple roles the teacher plays (facilitator, mediator, scaffolding, co-learner, manager and team player).

Lesson 1 was basically one-sided with teacher doing the talking and learners seemingly passive listeners. In Lesson 2 he gave what I think were clear instructions to guide the learners. He also went around talking to learners, glancing into their microscopes and commenting on the observations, encouraging struggling learners by using a pair of girls [who had successfully identified and draw the vascular bundle] as an example. In Lesson 3 the teacher demonstrated and gave the learners an opportunity to do the activity. He encouraged the learners by asking 'why' questions to make them think more about what they were doing.

In summary the teacher was able to facilitate and scaffold very well in lessons 2 and 3. There is no evidence to this effect in lesson 1.

Curriculum and epistemological perceptions of the learner-centred approach.

In Lesson 1 he seemed to undermine the learners' intelligence and prior knowledge. He would give the learners an opportunity to say something but then intervene before they could respond although this is higher-grade class. He also gave too much information in one lesson. Most of the time the learners were listening to the teacher, or were they? In Lesson 2 the learners made their own arrangements on how they were going to work. The teacher kind of faded but was quick to help when called upon. Such kind of support ensures that the learner is never left alone nor is she held back by direct and intrusive teaching (Wood, 1998). They were able to engage in discussions without the teacher pushing them and were willing to invite the teacher to

show him what they were doing. He was also pointing out specific cells to look for, as these would play a big role in the coming lessons. In Lesson 3 the teacher demonstrated capillary movement. This is a form of scaffolding. The teacher gave the learners the opportunity to do the activity while he was asking 'why' questions and pushing them without being intrusive. The learners talked about the activity and suggested possible reasons and went over the activity again.

In summary the teacher seems to have an understanding of how learners learn and seems to have good subject knowledge. However lesson 1 does not reveal this epistemological understanding.

Reflective and being reflexive practitioners.

In Lesson 1 there is no evidence of reflection in this lesson apart from the realisation that he had left out hydrostatic pressure the previous lesson. In Lesson 2 the teacher told the learners to pay attention to the diameter of the xylem vessels, as this would have an influence on capillary movement, which they will learn later. This shows that the teacher is aware of what the learners should know now in order to understand the coming tasks. Lesson 3 shows the application of the capillary principle and the learners wanted to know why they were getting wrong results. They talked about it and suggested possible reasons. They were reflecting on what they were doing and looking for better ways to understand the problem. This shows that not only the teacher is supposed to reflect but the learners should also be given the opportunity to do so.

In summary the teacher seems to realise that current lessons will have an influence on how the learners will understand the whole water transportation topic. He keeps reminding the learners about this issue. This suggests that he thinks about what he is doing.

In conclusion the lessons are revealing the following:

- The teacher does not seem to take prior knowledge into consideration.
- Apart from Lesson 1 where the evidence is not convincing, the teacher generally promotes both collaborative and individual learning.
- The teacher was able to facilitate and scaffold very well in Lessons 2 and 3. There is no evidence to this effect in Lesson 1.
- The teacher seems to have an understanding of how learners learn and seems to have good subject knowledge. However Lesson 1 does not reveal this epistemological understanding.
- The teacher seems to think about what he does, as this will have an influence on learners' understanding of the coming topics.

*** The workshop.**

<p>Taking the learner's prior knowledge into consideration.</p>
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On T1's Lesson 2:

What is the understanding of the local community on sex determination?

They say this woman does not give me a boy it is only girls.

Do the learners know now?

It should have been emphasised. I remember a case that happened. He divorced his wife that she is always giving him girls. Then he went and married another wife who gave him a girl too. Then everyone said you see now it boils down to you...this lesson should have been very clear that no, that understanding is not scientifically correct.

Those are some of the areas that should have been interesting in class discussions.

Then you would have had many beliefs coming from different backgrounds on how boys and girls are formed.

On his Lesson 2:

From the Life Science in Grade eight they should have known that this is it. But I have not been able to test whether they still have that knowledge now. Otherwise I have set out to explain transpiration pull linked it up to osmosis we had and I was able to do that. ...I should be able to use their previous knowledge. It makes it easier to

understand what period of the day are most stomata open and should correspond to the period of the day of watering. And I should be able to relate that too. But for know this is what I set out to do. But should be able to add that.

In summary it seems that the teacher understands what prior knowledge is as well as its importance in making understanding easier.

Promoting collaborative as well as individual learning.

On T1's Lesson 1:

...One good thing I like is that learners were able to work together, come up with feedback. Even though the feedback is not encouraging from the comments that were given by the observers. But that there was a kind of feedback, a kind of group work and an element that learners should be able to do something at home.

In summary the teacher recognises collaborative as well as individual learning.

Awareness of multiple roles the teacher plays (facilitator, mediator, scaffolding, co-learner, manager and team player).

Do we have time as Biology teachers ...to meet and discuss some of these issues...?

She does not have time [T 2 referring to T1].

But do you find it necessary? [follow-up]

Yes, you see she has to dangle between science and languages because she is the only one and the weight on her is quite heavy. I have to dangle between Biology and Physical Science. I have forty-five periods a week and other curricular activities in the afternoon. Sometimes it is difficult to have that dialogue.

But do you feel that it is necessary? [follow-up again]

Yes it should be. Especially for people in the same discipline area, Life Science, Biology and Agriculture.

On his Lesson 2:

...The advantage of it was as I said the class was small and you could easily go around. ...Did you see that? Yes, that is the one that carries water to the stem and

leaves. So now I am satisfied that they can see the xylem in the roots, stem and leaf. If it were forty, ooh! ...It would have been a little bit chaotic.

In summary the teacher understands the importance of sharing experiences. He also understands that a small class allows for better facilitation.

Curriculum and epistemological perceptions of a learner-centred approach.
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On T1's Lesson 1:

The topic seems to be hanging without the objectives being achieved. The lesson topic is Chromosomes and Genes and now we come to sex cells and how they are formed. Which is mitosis and meiosis. Although those two areas might be linked because sex cells have chromosomes and genes we need to say what we want to do. We want to look at what a chromosome is, where can we find it, how many chromosomes are found in a cell and what do these chromosomes contain. Also giving examples that the number of chromosomes is not the same in the same person, that is, between other body cells and sex cells. This should be done step by step. That should have been the end of the lesson. But I thought for those areas that I have been teaching it has been very interesting especially if you use characters that are found on the learners themselves. Like the rolling of the tongue, I cannot do but half of my class can. That was a character that I was not given therefore I do not have.

On T3's Lesson 2:

The...measurement skill needs to be re-emphasised. And the scaling needs to be carefully looked at. Scaling cannot be determined unless you do the measurement directly yourself. ...Because each one of them will get something. But you do not know whether it is the correct size of the drawing that he is using. He will say that I got two and you will say that is correct you are within the limits. Whether the drawing was two [centimeters] you do not know.

On his Lesson:

Did they connect transpiration to the watering of their garden or field?

We were not able to relate to that, no.

Would it be appropriate? [follow-up]

It would be appropriate because there is an activity that comes on when period of the day are stomata openings most open and factors that affect water loss in plants. This should be a bigger part of their understanding. But then it comes in later when we talk about the factors that affect the rate of transpiration.

In summary the teacher seems to have good subject knowledge and understands how learners learn.

Reflecting and being reflexive practitioners.

On T3's Lesson:

The first comment I observed was that the revision was not specific, specifying what is to be done. The second area was the lesson did not finish. The observers left after fifty minutes so they would not have known what has transpired after the task. Whether there was the conclusion, which was reached later. Whether some comments made were supposed to have been made or not. So then I noticed there was a lapse between the observation period and the lesson period.

On his Lesson 1

This one even though it is mine I could see areas if I am asked to re-deliver I could improve on that. The lesson topic is Transport in plants. ...The previous lesson has talked about the first explanation, which is osmosis. ...I realised that there was a concept I left out during the previous lesson. Which was the hydrostatic pressure concept. Now this is a higher class it is not an ordinary IGCSE. Then I said fine I can be in this lesson by going over the previous lesson and making sure that I bring in what I had left out which they will need later in the discussions. So that is how I started the lesson. As to how I could have delivered this lesson to be more practical I thought using the resources I have, the dye and the herbaceous plants, was the best I could.

On the demonstration: I am honest I took all of them to be of the same size. But I... could have asked them to stand up rather than linking up seated. Then I could have used the door as the stomata pore. Then escaping out of the door being to the atmosphere and the column coming in. Now it is a little bit clearer. I can modify on that demonstration too. For the homework I like that one I gave them. The fact that I

was able to reflect on the lesson that I left out a topic and I was able to come back and bring it in. ...I like that one too. Of course I did help the learners in some areas. I could have given them as homework to find out. Next time I will give them to find out and come back and share results

On his Lesson 2.

... It became difficult to say yes it is group work or yes it is individual work. But at the end of the day I allowed them to move from one preparation to the next. And another thing that I liked also was I did not imagine that they were going to have that skill of getting the cross-section well. They did surprise me. I was happy with that.

What would you do if you were wearing my shoes?

You see a teacher advisor [AT] has two roles. He is the one that co-ordinates. He knows the strength and weakness of each teacher and co-ordinates those areas and creates a pool of teachers. But you find that the AT is also handicapped. He hardly has the means of linking with the schools because of budgetary constraints and other facilities that are not available. So even if he had those concerns on his schedule he is not able to address them.

In summary the teacher seems able to reflect on his lessons and is able to see gaps in the other teachers' lessons.

In conclusion the this discussion reveals the following:

- The teacher understands what prior knowledge is as well as its importance in making understanding easier.
- The teacher recognises collaborative as well as individual learning.
- The teacher understands the importance of sharing experiences. He also understands that a small class allows for better facilitation.
- He seems to have good subject knowledge and understands how learners learn.
- The teacher able to reflect on his lessons and is able to see gaps in the other teachers' lessons.

4.3.1.3. Teacher 3 (T3).

T3's interview does not feature here (refer to chapter three).

*** Lesson observations.**

T3 was class visited three times and the following is a commentary of her lessons.

The lessons were revision lessons and based on topics where learners had problems.

Taking the learner's prior knowledge into consideration

In Lessons 1 and 2 the teacher seems to take prior knowledge into consideration. In Lesson 3, although asking probing questions, the experiment had the feel of 'done by the teacher' with the learners being mere spectators.

In summary the learners' prior knowledge was taken into consideration in Lesson 1 and Lesson 2 but not in Lesson 3.

Promoting collaborative as well as individual learning

In Lesson 1 the teacher gave the learners the opportunity to talk but the boys were more dominant despite their smaller number. They did not give the hesitant girls any chance to read their answers. Fortunately the teacher was aware of this and intervened repeatedly by asking the girls to give their answers. In Lesson 2 like in the previous one the learners had an open discussions where individuals gave their answers.

In Lesson 3 the learners were observing and writing down individual observations. There was very little learner interaction.

In summary there is evidence of recognition of collaborative as well as individual learning in Lesson 1 and Lesson 2. Lesson 3 was based more on individual learning only.

Awareness of multiple roles the teacher plays (facilitator, mediator, scaffolding, co-learner, manager and team player).

In Lesson 1 the teacher gave one learner the opportunity to lead the lesson during the first twenty minutes. The teacher rephrased some of the questions the learner was asking his classmates. She was therefore facilitating the direction the lesson was taking and mediating between the lead learner and the class. She took over for the last part of the lesson to reinforce what the class has been discussing. She was asking 'why' and 'how' questions. She was managing the class well and she knew where the lesson was going. She was to facilitate and scaffold during Lesson 2. However she seemed not worried by the fact that most of the learners could not measure and convert centimeters to millimeters and vice-versa. In Lesson 3 scaffolding and facilitation were evident but she seemed not to realise that the learners could not make connections between this revision lesson with original lesson, it was still new to them.

In summary the teacher was able to facilitate and scaffold in all three lessons but more so in the first two.

Curriculum and epistemological perceptions of the learner-centred approach.

In Lesson 1 and 2 the teacher gave the learners an opportunity to talk to each other. This can allow the teacher the opportunity to see the level of understanding of the learners on certain issues. Re-phrasing some of the learner's questions also helps the learner to reflect on her understanding from an informed position. She seems to have good subject knowledge and aware that learners should be responsible for their learning but she did not listen with a critical ear when learners were discussing so as to be able to pick divergent and emergent ideas and follow them up. In Lesson 3 the teacher did not give the learners the opportunity to handle materials, set the experiment and test their hypotheses. Lack of resources is an issue of great concern in a constructivist classroom. A teacher inspired to change to constructivist instruction must accommodate these realities into her approach to teaching (Brooks and Brooks, 1993). The same activity word for word is in the grade eight textbooks, which they

could have borrowed instead of spending time on writing instructions. It seems that the teacher is still operating in her small cocoon.

In summary the teacher seems to realise that learners learn better when they are actively involved in their learning. Unfortunately she does not address emergent issues. She is sending mixed signals as to her understanding of learner-centred approach to teaching and learning.

Reflective and being reflexive practitioners.

It looked like the teacher was following the same plan she used in teaching the lessons for the first time.

In summary, it is good that the teacher has realised that there are subject areas where learners have problems and therefore needed revision. This suggests that the teacher reflects on her teaching. However she does not seem to take time to diagnose what went wrong in the first place so that she could then plan thoroughly. Perhaps she takes revision as routine work and prescriptions from school management and as a result she does not put her energies into making sure that the learners get something from these lessons. Perhaps she does not believe in revision herself.

In conclusion the lessons are revealing the following:

- The learners' prior knowledge was taken into consideration in Lesson 1 and Lesson 2 but not in Lesson 3.
- There is evidence of recognition of collaborative as well as individual learning in Lesson 1 and Lesson 2. Lesson 3 was based more on individual learning.
- The teacher was able to facilitate and scaffold in all three lessons but more so in the first two.
- The teacher seems to realise that learners learn better when they are actively involved in their learning. Unfortunately she does not address emergent issues. Therefore she is sending mixed signals as to her understanding of the learner-centred approach to teaching and learning.

- The teacher seems to revise subject areas where learners have problems but she does not seem to do so with conviction. This suggests that she reflects on her lessons but does not take time to think deeply about how she can improve the situation the second time around.

*** The workshop.**

Taking the learner's prior knowledge into consideration.

On T1's Lesson 1:

And in the introduction the teacher should have asked the learners to define chromosomes and genes instead she went straight to mitosis and meiosis.

On her own Lesson:

Do you think these learners cannot reason?

They can reason but may be if I end up telling them they say it is ok. It is like that they realise later on. Because if you still remember in today's lesson where I asked them why do we have to dip the leaf in boiling water. I had to hint them, go back to enzymes. That is when they said ok. They cannot make connections.

But this about dipping the leaf in boiling water have they tried it out themselves?

Ja we did that last year but when we did it again today it was like a new lesson to them

So what does that suggest?

I think it is lack of interest.

From all of them?

They do not care I can say.

In summary the teacher is blaming the learners for not making connections yet when she scaffolds they seem to get to an understanding. She does not seem to realise that by hinting and asking leading questions she is doing what she is supposed to do. She has to understand where the learners are.

Promoting collaborative as well as individual learning.

On T1's Lesson 1:

But group work and feedback are fine and the method she used is suitable.

On T2's Lesson 2:

The topic is clear and the objectives can be achieved. But what I do not get is, was it group-work or what?

On her lesson:

It is like that yes. Girls are very passive. I have to force them to participate. So it means that it is the boys who are active.

Can a teacher plan his way out of this gender bias thing?

Like there are times where I say only girls should answer this question. Sometimes it works. I have to force them.

In summary she understands that it is her duty to promote collaborative learning.

Awareness of multiple roles the teacher plays (facilitator, mediator, scaffolding, co-learner, manager and team player).

Do we have time as Biology teachers ...to meet and discuss some of these issues...?

Do you feel that it is necessary?

Yes it should be.

In summary there is no evidence.

Curriculum and epistemological perceptions of a learner-centred approach.

On T1's Lesson 2:

The objectives are not really clear and not achievable. It says recognise chromosomes and genes. ...The lesson is on sex cells and it seems to be dominated by meiosis and mitosis. And I think those three do not go together. The teacher is lacking in confidence because it seems that everything comes from the textbook. Learners might

not have confidence in their teacher. This lesson is useful to the learners because they are supposed to know why this is a boy and the other is a girl.

On her lessons:

Their reasoning capacity is a problem. They cannot reason.

...Like today's practical on the testing the leaf for starch, I had to go back to the food test that we did on the testing of rice for starch. But when I asked, "when we did food test last year, what were the results? What did we use?" It is the same starch but they could not even remember it is iodine. Until I said we are still using iodine and we are still getting the same results. They cannot apply knowledge on the practical until you guide them.

So how should we then teach them?

We have to practice patience and keep on repeating the same concept until they understand properly.

In summary the teacher seems to know that she has to practice patience and keep on repeating the same concept until learners understand. But she does not to practice this understanding. She blames the learners for not understanding instead.

Reflecting and being reflexive practitioners.

On T1's Lesson 2:

Do the learners know what they were looking for in dominance and recessive? What is dominant to what? Then she went on to talk about reproduction which I think is out of context in this particular lesson because it is about: "how sex is determined". As I see it the concepts are all mixed up. And there is no reflection on the previous lesson.

We are saying that chromosomes and genes start from the Grade ten syllabus. And you will find that the teacher who is teaching this grade is just teaching it because she was just given the subject. So if learners proceed into Biology at matric level they may still find difficulties because they did not understand these concepts right from the beginning. So we go back to specialisation.

On her lesson:

This was a revision lesson. ...I think I should have specified at the beginning of the lesson. I am just trying to find out if they still remember what they did and whether they can apply their knowledge on the questions. Maybe I should have picked a few questions from one paper and some from another paper from a different year but related topics.

What are you going to do as the teacher concerned?

I think I will have to work hand in hand with the Mathematics teacher. To try and work as a team and try to help these learners.

Did they do the actual exercise?

I did a demonstration because we do not have resources – like I had to buy the spirit.

So it is you doing the experiment but not the students?

We were doing it together.

Could they change...if they were more involved in the actual process?

Ja, I remember like when we did the dissection of the heart. ...They enjoyed it because they were doing it themselves. I know it depends on our resources because at this school I had to buy for myself if I need to do a certain practical.

Have you learnt anything out of this session?

Like at times we just prepare. But like her [referring to T1] lesson we also learn it is nice and easier to link up lessons. And also I may think my lesson is perfect yet not knowing that there is some loop holes in my own. I just took it for granted that since I am doing revision every one would follow. I think I learnt.

In summary the teacher seems to reflect on her lessons and on her colleagues lessons. She also seems to understand how learners learn. But then she is not reflexive and blames the learners for everything.

In conclusion what the discussion reveals:

- She does not seem to realise that by hinting and asking leading questions she is doing what she is supposed to do.
- She understands that it is her duty to promote collaborative learning. There is no evidence of individual learning.

- The teacher seems to know that she has to practice patience and keep on repeating the same concept until learners understand. But she does not to practice this understanding.
- She could reflect on both hers and her colleagues' lessons but is not reflexive and blames the learners for lack of understanding.

4.3.1.3 Teacher 4 (T4).

T4's interview does not feature (refer to chapter six). She missed the workshop.

*** Lesson observations.**

T4 was class visited three times and what follows is a commentary of her lessons.

The lessons were generally based on human nutrition.

Taking the learner's prior knowledge into consideration

In Lesson 1 the teacher asked questions on the previous lesson. Then asked a girl to classify a sample of food into groups. The learners could show what they could and could not do before the teacher could help. Learners add other names of food items on the list and suggest the groups they belong to. A similar trend was followed in Lessons 2 and 3.

In summary the teacher recognises learners' prior knowledge.

Promoting collaborative as well as individual learning

In all three lessons the learners worked in-groups and gave feed group feed back. They were also answering questions as individuals. However feedback does not receive the attention it deserves. One feels as if the teacher is doing routine work.

In summary the teacher promotes both collaborative and individual learning.

Awareness of multiple roles the teacher plays (facilitator, mediator, scaffolding, co-learner, manager and team player).

In all three lessons the teacher gave good instructions before activities were done. Asked guiding questions and walked from group to group encouraging the learners to get involved. In Lesson 1 the teacher imposed her answer on the learners without seriously thinking about it. In Lesson 2 she hung a very small poster on the wall and told learners to identify the parts. Learners complained about the size of the poster but labeled the parts anyway. Encouraged learners to ask questions. Did not follow on many of the learners' answers in all the lessons.

In summary there was evidence of facilitation but very little scaffolding. The teacher does not seem to realise that she is a co-learner and therefore is not expected to know everything. There are instances where some learners will be better informed than she is.

Curriculum and epistemological perceptions of the learner-centred approach.

She did not regard learners' answers as important in all the three lessons. For example in Lesson 3 the whole moral issue of alcohol and alcohol abuse came to the fore but she let the opportunity slip through her fingers. This issue is not only prescribed by the syllabus but is a big community debate. It could have been interesting to briefly gather opinion from the class. Does this show a lack of curriculum understanding? It is difficult to say but it surely shows a lack of epistemological understanding. In a constructivist classroom the learners' answers, whether wrong or right, do matter. They tell us about the state of affairs and therefore direct us to subsequent actions.

The teacher guided learners to relevant information through questions. I liked the way she was pushing girls to participate in the lesson. Her subject knowledge is, however, a bit suspect.

In summary the teacher seems to recognise that learners learn from each other in that she encourages group work. She is also able to guide the learners through learners. But she does not take learners' feedback seriously and is therefore sending mixed

signals in as far as her epistemological understanding of the learner-centred approach is concerned. Her subject knowledge is also suspect. She makes a lot of factual mistakes.

<p>Reflective and being reflexive practitioners.</p>

Wrong answers reveal as much as right answers do. Unfortunately she does not seem to have a critical ear because she leaves critical gaps that need closing up. Perhaps her suspect subject knowledge has something to do with it. Alcohol abuse is a big problem in the region. To state that we do not get anything from alcohol yet we spend so much money and time on alcohol needed a debate.

In summary she does not reflect on her lessons nor does she critically reflect on what is happening in her community.

In conclusion the lessons are revealing the following:

- The teacher recognises learners' prior knowledge.
- She promotes both collaborative and individual learning.
- There is evidence of facilitation but very little scaffolding.
- She is sending mixed signals about her epistemological understanding of the learner-centred approach. Her subject knowledge is also suspect.
- She does not reflect on her lessons and what is happening in the community.

4.3.2. The learners.

*** The interview.**

The data covers two criteria only because these are the areas the learners are exposed to in the classroom.

Taking the learner's prior knowledge into consideration.

Group 1 (L1).

What about the teaching force, are you happy?

With some we are not. It is like some of our teachers are not very enthusiastic in class. All they do is write summaries and talk, which is not nice. They do not give us assessments. At least they should be more active in class. Help us to do things and also they should give us homework.

What is good about that? [Follow up]

This will remind us when we are writing an exam. You come across a question then you remember what you were doing. To see whether we understand. Not just to tell us and off he goes and waits for the examination. That is why may be we fail in other subjects.

What about in Biology? [Follow up]

In biology we are ok. ...Our teacher is very, very fair to us. He gives us everything we need. When we tell him we want to do this, we are welcome to do it. He gives us the opportunity.

Group 2 (L2).

How is a lesson like family planning introduced, how is it taught, how do teachers present it?

Well according to the teachers they give it to us. It is common we know. We know what is happening so we have to voice out our ideas than leaving our teacher to explain. ...The more we talk and put our suggestions the more we understand. This type of teaching makes us feel confident so that we can improve our English

In summary the learners are saying teacher telling and the writing of summaries is not good. They would like teachers to help them do things. They also understand that group discussions help improve their English competency.

<p>Promoting collaborative as well as individual learning.</p>

Group 1 (L1).

One of you mentioned working in-groups, how important is that?

Other learners are shy to stand up and give answers to everyone in class. In-groups they are not shy any more. They talk and give their views. You learn from others. ...So if you come in-groups with your friends you can be free to ask questions. ...One of them might have a view of the topic and might help you understand it better than a teacher.

Individually.

I will make sure that I study so as to pass the next test and also improve on my work. I will go through my work. ...I will go back to the teacher and explain further. ...You try and search all the books around you. That is where you will find the information and find the answers. And you will understand better than what you heard from the teacher. Even teachers when they teach there are some things that they leave and when you read in other books then you find them.

Group 2 (L2).

What do you think is the role of the learner in a lesson?

I think it is participation. When you participate you see, sometimes you were not in good state with the information and by so doing you can find out more things that you do not know. You do research and gain more knowledge. Well the other advantage is like learner-centred where learners come together and share ideas. It is very important because some other learners fear to talk to teachers. But if you are in a group with your friends, if you have an idea you won't keep it to yourself but you voice it to other learners.

In summary the learners value group work but they also recognise individual work (through individual research). They state in no uncertain terms that they learn from each other during group work.

In conclusion the learners are saying the following:

- The learners are saying teacher telling and the writing of summaries are not good. They would like teachers to help them do things and that teachers should be enthusiastic in class.
- The learners value group work but they also recognise individual work (through individual research). They state in no uncertain terms that they learn from each other during group work.
- They are happy with their Biology teachers.

4.3.3. School inventories.

4.3.3.1. The Heads of Departments' lesson observation schedules.

Curriculum and epistemological perceptions of a learner-centred approach.

The information I have here is from School B. As for School A I was not able to find class visit reports on file. I do not know whether this confirms what the principal told me in our interview. The fact that only teachers with problems are class visited. Perhaps these two teachers in my research project are among those without problems. In any case I was able to go through Teacher 1's preparation book. It was checked and signed at regular intervals by management without any comments. I am not sure whether this is ordinary routine work or something done to help the teacher. It is important for management to give constructive comments to teachers.

As for Teacher 2 at the same school he told me that he prepares but does not believe in putting it down. He reads and prepares tools for what is to be done that day.

The comments that follow refer to School B. I will concentrate on recommendations that heads of departments give during each class visit. Teacher 3 informed me that they always have post-visit discussions with the HOD after each visit.

I will label them HOD 1 and HOD 2.

- **HOD 1**

On 17/3/98.

“The learners were supposed to be divided into smaller groups of five each for them to fully participate in the lesson”.

Group work now rules and group size is not a problem as our observations show.

On 4/10/99.

“It is strongly recommended that learners should be given a lot of exercise to write, so that discussions should be based on learners’ answers”.

What do our observations reveal? Learners’ answers especially if they are wrong do not feature much in class discussions despite the HOD’s comments.

On 21/6/2000

“The lesson was enjoyable and learners were involved through out the lesson. The lesson was really a success”.

On 5/7/2001

“The lesson was very interesting and the learners were also actively involved. Keep it up”. This is the same lesson observer 2 and I also observed and our observations differ from that of the head of department. Refer to Appendix 1.

In summary the HOD is concerned about the size of groups. Smaller groups work better. She is reminding the teacher to give more written work but does not mention the quality of the written work. However, she is sending mixed signals about her understanding of an interesting lesson.

- **HOD 2.**

On 20/6/2000

“It was indeed a good lesson and was learner-centred. You keep it up”.

On 13/3/2001

“It was a good lesson. Always try to involve group work during the lesson. Few examples of animal feeds could be used as teaching aid to your class. On the whole it was a good lesson. Keep it up”.

Although group work does not guarantee that the lesson is learner-centred it is part of learner-centred methodology.

On 20/6/2001

“It was indeed a good lesson. You keep it up”.

In summary the HOD is happy with the lessons and emphasises group work.

In conclusion the HODs’ lesson observation schedules are revealing the following:

- The two HODs are referring to group work as an important element of teaching.
- They are happy with they way teaching is done.
- No constructive comments on how to improve or enhance learning.

4.3.3.2. Staff and subject meeting minutes.

I am combining these two areas because the minutes reveal more or less similar information. It also becomes easier for me to compare what teachers say during staff meetings and what they say during subject meetings where in most cases management is not involved. This might cast light over the teacher-management relationship.

Unfortunately I was only able to find a record of one staff meeting from School A.

The rest is from School B

Taking the learner’s prior knowledge into consideration

The only reflection on prior knowledge is in the minutes of the cluster meeting held on 18/05/2001: Learners should be allowed to identify topics they have problems with so that they can be assisted.

Promoting collaborative as well as individual learning.

As in the above criterion this topic seems not to be an issue in their discussions. Yet it is frequently referred to during class visits by heads of departments in the name of group work.

Awareness of multiple roles the teacher plays (facilitator, mediator, scaffolding, co-learner, manager and team player)

School A.

In a staff meeting held by School A, the feeling in this meeting was that the principal was allowing the staff to participate in the meeting. To me this reveals that the staff is aware of its responsibilities and should not only receive instructions but also have a role to play in the day to day running of the school.

School B.

The principal gives his staff the opportunity to air views on topics under discussion. In the first meeting [first according to the records I collected] most of the staff's concerns were around learners' lack of discipline. Which brings to question the learner-teacher relationship. Another issue is that teachers are encouraged to class visit each other including the heads of departments and they should report objectively. This is a good idea if it is aimed at staff development as such and not for the proposed file where the principal will file positive and negative comments [staff meeting 7/6/2000].

In summary the evidence shows the differences between the two schools in terms of teacher support. P2 allows teacher participation in the management of the school.

Curriculum and epistemological perceptions of a learner-centred approach.

School A.

In reply to a question raised by a staff member on what learner-centred approach is. [17/02/2000. The principal (P1) had this to say: "*The teaching and learning process requires determination and dedication. The learner-centred approach requires that*

teachers should become facilitators and prepare thoroughly. It requires participation of both the teacher and the learners but the learners dominating with the activities”

This shows that the principal seems to have an understanding of the approach and this matches the principal’s understanding on a similar question in the interview. However his emphasis on dominance of activities will be highlighted under data discussion.

School B.

Teachers are encouraged to conduct subject meetings each term as a response to an inspection by the subject advisors the previous year. Teachers are also encouraged to prepare every day and to give learners assignments, projects, class work and these should be properly controlled. The other issue emphasised is that learners should be given summaries. The purpose of the summaries is not mentioned.

The question of completing the syllabus during the second term was mentioned by Teacher 1 from School A in the interview and is mentioned here again. *Science and mathematics require continuous practice for the learners to master a concept. Therefore finishing the syllabus in the second term is not the issue* [11/8/98]. It is mentioned again [28/5/99] *...considering the poor background of our learners, finishing the syllabus by the second term is not a problem, but how much would they grasp?* In the staff meeting held on 7/6/2001 it was emphasised that *“...teach to complete the syllabus as well as preparing the learners for final examination”*.

In summary the purpose of subject meetings is undermined as it is done to satisfy ‘inspecting advisors’ [should they be inspecting?]. Secondly there is a disagreement between what teachers and managers are saying on the issue of completing the syllabus. This shows that teaching is still being enslaved by high stakes external assessments which are a feature of the positivistic paradigm (Wilmot, 2000).

Reflecting and being reflexive practitioners.

The principal encouraged the staff to read examination reports and prepare learners accordingly. Learners who are not performing should be identified for attention. The JSC and IGCSE November/December results are analysed every year. Teachers are encouraged to use past examination papers in their revision so as to acquaint learners

with the format of the examination as well as the type of questions they are likely to come across in the examination.

In summary the teachers are teaching to the test.

In conclusion the staff and subject meeting minutes reveal the following:

- Prior knowledge and the promotion of collaborative learning do not feature.
- P2 allows more teacher participation in the management of the school than P1.
- The purpose of subject meetings is undermined as it is done to satisfy ‘inspecting advisors’. Secondly there is a disagreement between what teachers and managers are saying on the issue of completing the syllabus. The teachers are more concerned with learners’ understanding of what they learn while managers emphasise the completion of syllabi by term two of a three-term system.
- Teachers are teaching to the test.

4.3.3.3. Tests and learners’ written work.

Taking the learner’s prior knowledge into consideration.

This is very difficult to identify in questions. However questions that focus on the learner’s immediate surroundings can be categorised as within the learner’s prior knowledge. Some questions [very few indeed] may be classified as taking the learner’s prior knowledge into consideration. For example: *In your own words give the meaning of...* (T4).

As far as written work is concerned it follows the same pattern as tests. The teachers are looking for facts and not deeper understanding.

In summary prior knowledge is not an issue here.

Promoting collaborative as well as individual learning.

There is no evidence of collaborative learning in this data. In written work the learners answer the assignments as individuals.

Awareness of multiple roles the teacher plays (facilitator, mediator, scaffolding, co-learner, manager and team player).

This is another area where tests and written work did not reveal much.

Curriculum and epistemological perceptions of a learner-centred approach.

The teachers follow the format and style of the national examination paper. Of late these question papers (especially at grade ten level) have been emphasising factual information at the expense of understanding and knowledge application (Wilmot, 2000). I went through six tests with a combined mark of 290 and only one small question asked for a 'why' answer: 2. (ii) *Why is it higher in that organism?* (2 marks). The following form most of the questions in both written work and tests: name, list, identify, explain how, differentiate, describe, give, which, what, define, label, compare, suggest, discuss, state, and distinguish. The quality of the questions themselves and the control thereof is another issue. Some teachers do not control spelling and grammar mistakes. This defeats teamwork and the policy statement of English across the curriculum.

Reflecting and being reflexive practitioners.

In a subject meeting [subject meeting minutes of 28/05/1999] ...*Considering the poor background of our learners...* This suggests that teachers are aware and can reflect on some of the issues that hamper learning.

In conclusion the documents reveal the following:

- The examination dictates how teaching is done.
- Written work follows the same pattern as the tests examination.
- There is an emphasis on facts rather than on conceptual understanding.

4.3.4. Principals.

* Interviews.

4.3.4.1. Principal 1 (P1).

There is no evidence that covers the first and second criteria.

Awareness of multiple roles the teacher plays (as facilitator, mediator, scaffolder, co-learner, researcher, manager and team player).

What do you think can be done to help the teachers who are still struggling?

... We have done some workshops at school level to try and reinforce this approach. To try and help these teachers. ...When you class visit someone it is not for criticism but to try and help improve on that person. I am really hopping that one-day the regional office will come and assist these teachers with new skills. And also in motivating these teachers...

The teacher's curriculum and epistemological perceptions of the learner-centred approach.

What is your opinion on how the education reform was introduced? Was it necessary?
I don't have much of a problem with the reform as such. ...It was necessary because...we needed a uniform system for everybody. ...From my experience. ...Not enough consultations and information for everybody to know and understand what is going on. You get teachers that are ready for it and teachers that are caught up between the old and the new system. ...And it is not easy to change one thing to the next thing over night. You need a lot of time before you change. ...Teachers should be assisted properly and also motivated to work very hard...only hard working teachers...will succeed with the learner-centred approach.

What is your understanding of the learner-centred approach?

...This approach needs a lot of preparations. ...Preparing for all other activities that learners must be involved in. ...Learners doing three quarters of the work themselves. Learners at ease and happy. ...And the teacher is there as facilitator.

How do you see your teaching staff, have they bought into learner-centred approach?

There are two groups. The new blood, teachers that are coming now and completing now are easily applying this approach ... but the old teachers are still stumbling somewhere.

<p>Reflecting and being reflexive practitioners.</p>

What is your understanding of reflective teaching?

This is also a problem because may be today the examples that we are giving ...we are using this ideology of do what I tell you and not what I do. Which is not very good. Reflective teaching is very good because the learners will always take the examples that the teacher is giving. But if that is not the case then there are some problems. Good example in punctuality, in attendance, performance, will also force learners to do something like that.

In conclusion what the interview reveals.

- There is no evidence of an understanding of prior knowledge or the promotion of collaborative and individual learning. Direct questions could have helped.
- The principal understands that school based teacher support is important. He is also crying for help from the regional teacher support services.
- The principal supports the reform although he feels that there were no proper consultations before implementation. He also understands that learner-centred approach requires adequate preparation and hard work, where the teacher facilitates and the learners do most of the work. He also brings to light the issue of the difference between the current crop of graduates and the old teachers. If what he says is true, then it seems that the colleges of education and the universities have a new understanding of knowledge and how we come to know.
- He does not understand what reflection means.

4.3.4.2. Principal 2 (P2).

Taking the learner's prior knowledge into consideration

What is your perception of a learner-centred approach?

...In the olden days we thought the teacher was the source of all knowledge and disregarded what the learners already knew, the background of the learners. In the Learner-centred approach the teacher must find out what the learners know on a certain topic and then try to expand by leading the learners.

Promoting collaborative as well as individual learning.

No evidence.

Awareness of multiple roles the teacher plays (as facilitator, mediator, scaffolder, co-learner, researcher, manager and team player).

What is the school doing about in-service training?

When we go out to visit...we want to find out whether the teacher is doing the right thing. So in-service training must be given to teachers to help them. Fortunately we have started with a workshop for teachers...to try and help these teachers to discuss problems they have here and there. In a meeting last week I encouraged my teachers to form a sort of team teaching and peer coaching. I have even encouraged them to go as far as the other schools and invite teachers there to come down and help them.

The teacher's curriculum and epistemological perceptions of the learner-centred approach.

What is your opinion on how the education reform was introduced? Was it necessary?

The education reform was necessary because ...education was offered ...according to racial backgrounds and there was discrepancy between the education systems.

It was hastily introduced though because the system that came together with the learner-centred approach needed a lot of preparation by teachers. Teachers should have been prepared for what was coming. In the learner-centred approach the teacher must find out what the learners know ...the background of the learners ...then try to expand by leading ...must guide ...the learners. The teacher becomes a facilitator. Involve learners as far as possible. ...The learners do the talking and the teacher will lead them into the process of learning.

<p>Reflecting and being reflexive practitioners.</p>

What is your understanding of reflective teaching?

It is that someone at the end must reflect on what he has done. Must look back and see whether the lesson that the teacher has prepared and given to the learners was successful or not. If it was not successful then he must dissect it and find out the mistakes/pitfalls that made it not to be successful. There after if necessary repeat the lesson and improve on it. May be improve the methodologies, find new teaching aids that would help.

In conclusion the interview reveals the following:

- The principal has a good understanding of what prior knowledge is and its importance.

There is no evidence of the promotion of collaborative and individual learning. A direct question could have helped.

- He promotes school based teacher support in the form of workshops, team teaching and peer coaching.
- The principal supports the education reform although he feels that the teachers were not prepared for what was coming. He seems to understand what the learner-centred approach is.

He seems to understand what reflexive teaching is. He seems to suggest that the teacher does not have to reflect-in-action. The teacher waits until the end of the lesson before she can reflect.

4.4. Summary.

From the data that I have presented and analysed, the following tend to emerge: firstly the patchy understanding of what a learner-centred approach to teaching and learning is. Secondly the learners show an understanding of what the teachers should be doing in class. Thirdly the teachers are teaching to the test. The fourth point is that teachers are able to facilitate but are unable to scaffold. The fifth point is that they seem to promote group work without understanding when, how and why it should be used. Lastly they do not generally understand what reflective teaching is and, therefore, do not address issues that emerge from their lessons. P2 and T2 however seem to have an understanding of what reflexivity is.

In chapter 5, I will discuss the emergent issues. I will focus my discussion on the conclusions that emerged from each respondent as well as from the school inventories.

CHAPTER # 5.

THE DISCUSSION OF THE DATA.

5.1. Introduction.

At this stage of the Namibian education reform more and more attention is directed towards the teacher and the teaching situation. It is a time when we are replacing the traditional theory and practice (positivist paradigm) with a new constructivist paradigm altogether. It is also a time when we need to reflect on what teachers are doing and saying so that we can understand the realities of the reform process. It is a time when teachers' voices and stories are being pursued as bona fide reflective research data. It would have been grand during this interesting time if teachers themselves could directly spread the realities of their situation to the world. "Teachers talking and writing about their personal and practical experiences without contamination" (Goodson, 1999: 124). Perhaps then the policy maker would understand better and thus plan better. Unfortunately teachers' work intensifies as more and more new and centralised demands impinge on the teaching and learning situation and so the space for reflection and research is progressively squeezed. The voice of the teacher is only indirectly and not directly heard. It is heard through the voices of scholars who do research into the teacher's situation for their own scholarly purposes. Denzin (in Goodson, 1999: 123-124) calls it a case of "academic colonisation, or even cannibalisation".

If the text becomes the agency that records and re-presents the voices of the other, then the other becomes a person who is spoken for. They do not talk, the text talks for them. It is the agency that interprets their words, thoughts, intentions, and meanings. So a doubling of agency occurs, for behind the text as agent-for-the-other, is the other of the text doing the interpreting (Denzin in Goodson, 1999: 123).

However this does not mean that researchers cannot present the teachers' views as best as they can to the larger society and to the teachers themselves but this information remains second hand information. In analysing the data in the previous chapter I included as far as possible direct quotations from the respondents

themselves. I have reason to believe that my long standing rapport with the teachers involved in the research is an important element in my providing as true a representation of the teachers' views as possible. Hence I agree with Goodson, 1981 (in Goodson, 1999: 125) that "in understanding something so intensely personal as teaching it is critical we know about the person the teacher is".

In this chapter I will combine and discuss emerging threads from each respondent including findings from school inventories. In this way we will be able to understand how far the teachers in the research have developed, individually (from chapter four findings) and collectively (from common ideas as identified in this chapter), since the education reform. In this discussion I will draw on relevant literature to support my arguments. Where I directly quote the respondent I will show by way of Italics.

5.2. Common or central findings.

What follows is a discussion of the central findings from the data analysis:

5.2.1. Teacher support of the reform process.

Three strands are emerging:

- The political and social strand. Apart from T1, everyone is talking about the necessity of having a unified education system where every citizen has equal opportunity and given a sense of belonging. The old system was based on racial lines, they say. These are true sentiments but may suggest that one might support the current education system for political reasons. Teachers feel that they have been emancipated from the yoke of a discriminatory system. This attitude, where there is no critical engagement, can lead to blind loyalty to the new system and its possible implications are never questioned. If this is what the data implies then we might be exchanging one recipe for another. Constructivism as I have described in chapter two, demands that teachers should critically reflect on the system as a whole. Good citizenship should not mean blind loyalty. What is new is not necessarily better (Giroux, 1997). Critical thinking should be a bigger part of this new education system. We should be able to use individual and collective possibilities, "to go beyond the created structures in order to create others" (Merleau-Ponty in Giroux, 1997: 26).

- The implementation strand. Every interviewee is saying that the new system was hastily implemented. Logistics such as the preparation of teachers and the teaching and learning materials were not put in place in time. There was no proper consultation before implementation they say. I agree that in a democratic social constructivist system wide consultation is imperative. This is a paradigm shift altogether and we cannot expect personnel born, raised and schooled in fundamental pedagogics to suddenly buy into constructivism without proper introduction and induction (van Harmelen, 2001 a). As mentioned in chapter two, following recipes and specifications laid down by policy makers who neither know them nor their contexts curtails the teachers' professional freedom and autonomy (Sikes, 1993). Lest we forget that educational change depends on what teachers think and do, it is as simple and as complex as that (Fullan in Sikes, 1993). However, the above sentiments suggest that the teachers are willing to change.
- The uncertainty strand: What is it then? It is not teacher talking but learners talking and doing [T1] while the teacher facilitates and guides [P2]. The learner takes the centre of the learning process and the teacher follows what the learners are doing [T2]. Teachers should find out what the learners know first and then guide [P2]. Application of knowledge to life [T2]. It is slow and time consuming yet one has to complete the syllabus [T1 and T2]. Demands hard work and commitment, thorough preparation by the teacher [P1]. This shows an understanding of what learner-centred approach to teaching and learning is. However teacher talking is not bad and should not be equated with teacher telling (van Harmelen, 2000 b; McDermott, 1993). The teacher is an important part of the learning process and we do not expect her to behave like a fly on the wall but must be involved in guiding the learners. This involves talking to and prompting learners so that they can make meaning of what is being discussed. Neither does learners 'doing' and 'enjoying talking' guarantee learning. But the rest of the sentiments collectively suggest an understanding of the epistemology of a learner-centred approach.

5.2.2. The examination dictates what, how and when teaching is done.

The teachers are covering a lot of content in a forty-minute lesson. The tests emphasise the transmission of information and teaching generally focuses on what the examiner may examine and not for the construction of knowledge.

We teach and assess so as to enhance learning and not the coverage of a lot of content (Wilmot, 2000). The entire process as we indicated in chapter three requires time. “A single encounter is rarely sufficient to overcome serious difficulty” (McDermott, 1993). To be able to transfer a reasoning skill learned in one context to another, learners need multiple opportunities to use that same skill in different contexts. Inevitably, this constraint places a limit on both the breadths of material that can be covered and the pace at which instruction can progress. New topics cannot be added without omitting others. Unless we design instruction to meet the needs and abilities of learners, efforts to update the teaching of Biology or any other subject, will produce little of either intellectual or motivational value. Therefore the whole culture of the classroom has to change.

As we have seen from the analysis of the documents, tests and homework assess facts only. They do not test ability to reason and solve problems. They follow the pattern of the examination. In grade eleven and twelve there is no continuous assessment of the learners apart from odd tests and homework. The learners are saying this much, *“they do not give us assessments. At least they must be active in class. Help us to do things and also they should give us homework. ...To see whether we understand. Not just to tell us and off he goes and waits for the examination”*.

To be compatible with and support the social constructivist approach, classroom assessment and examination have to change in form and content. They must change to better represent thinking and problem-solving skills. Moreover a broader range of assessment tools like observations, interviews, reflective journals, projects, and learners’ self-evaluations etc. are needed to capture important learning goals and processes and to more directly connect assessment to ongoing instruction (Wilmot, 2000). Secondly, the way assessment is used in classrooms and how teachers and learners regard it must change. Its high-stake status belongs to behaviourist theories and it is therefore inadequate and incompatible with social constructivism (Shepard,

2000). The success or failure of learner-centred education will depend on the assessment systems that are employed. If the assessment and examination system does not reflect the paradigm shift there will be no paradigm shift (van Harmelen, 2000 c).

5.2.3. Teachers still work in isolation.

She does not have time. You see she has to dangle between science and languages because she is the only one and the weight on her is quite heavy. I have to dangle between Biology and Physical Science. I have forty-five periods a week and other curricula activities in the afternoon. Sometimes it is difficult to have that dialogue.

But do you feel that it is necessary?

Yes it should be. Especially for people in the same discipline area, Life Science, Biology and Agriculture.

In an education system like we have in Namibia where the social constructivist theory underpins and informs practice, the teacher is required to communicate with other teachers and all stake holders in general. She becomes a member of the school team, the circuit, the region and ultimately a national team member. Teaching is a difficult job as it is and one cannot do it alone (Bennett in Johnson and Johnson, 1994). Some subject areas will be difficult without help from the other teachers. The call then is that teachers should break their cocoons and share experiences (Letseka, 1995). But norms of collaboration do not simply just happen or spring spontaneously out of teachers' mutual respect and concern for each other (Rosenholtz in Leithwood, 1993). School managers should plan for them. The principal must have teacher development strategies in her plans (*ibid.*)

5.2.4. There is a general misconception of the learner-centred approach.

Although there is evidence to suggest that some teachers have a general understanding of a learner-centred approach, the information is not connected. The information occurs in 'bits and pieces'. In most of the lessons learners do not get the opportunity to explain their answers. Answers are either wrong or right. If they are wrong nobody refers to them. There is no room for debate, ten minutes is not much any way.

Learner-centred education perceives education as a recursive process and not linear or uni-dimensional nor is it compartmentalised (van Harmelen, 2001 b). Hence creating

a classroom culture where learners can explore, make mistakes and explain their thinking is seen as part of learner-centred pedagogy (Brodie, 2000).

Practical experiences in this regard will be very helpful in negotiating yet another corner among million corners in the learner's learning journey. But research findings have clearly shown that practical experience per se does not bring about learning until it is animated by ideas, and these ideas are carried into words (Sprod, 1998). Therefore it is not true to equate activity-based instruction with learning. In Sproedian language this means that the teacher should create the conditions for worthwhile rigorous open-ended discussions that spring from problems identified by the learners (Sprod, 1998). This then calls for skillful planning and facilitation of the discussions to ensure maximum contribution and participation by all the learners in the classroom, so that the goal is realised. At the same time the teacher should be involved and not refrain from making a contribution (Ritchie, 1998).

5.2.5. Teachers do not seem to understand the importance of prior knowledge and it is not therefore recognised in the classroom most of the time.

Textbooks can be good resource materials. However as we have seen from the definition of prior knowledge (refer to chapter two) they are not the only source of prior knowledge.

Giving learners topics to discuss, (the teachers are doing this) and then listening to the feedback is a good way of shifting the balance of responsibility to the learners (Brooks and Brooks, 1993). Secondly, in this way one would understand where the learners are (Dewey in Wink, 2000). However what do we do with the presumably wrong things that learners say? Are these wrong things important? Will these learners continue giving feedback, which is labeled wrong in the end? The 'wrong' things form the hangers for wrong knowledge constructions if the teacher does not address them. Besides when a learner has struggled to find an answer to a given problem, it is not only boorish but also counterproductive to dismiss it as wrong, even if the teacher then shows the right way of proceeding. Such a disregard for an effort made inevitably demolishes the learner's motivation (von Glasersfeld, 1992). Instead the teacher should ask the learner how she came to the particular answer. It is assumed that the learner, in reflecting upon the operations carried out, will discover a hitch or

give the teacher a clue to a conceptual connection that does not fit into the procedure that is to be learned. The first provides the learners an opportunity to realise that they themselves can see what works and what do not. The second provides the teacher with an insight into the learner's present way of operating and thus with a clearer idea of where a change might be attempted (von Glasersfeld, 1992). Thus "telling them the right things" (T1) without a thorough understanding by the learners why their answers are wrong is tantamount to rote learning. Development of a functional understanding cannot take place unless learners themselves go through the reasoning involved in the development and application of concepts (McDermott, 1993). This then brings the notion of reflexivity into the equation. Professional practice has as much to do with finding the problem as with solving the problems found (Schon, 1983). Reflexivity is discussed in the next point.

5.2.6. Teachers do not address emergent issues from their teaching, and cannot therefore reflect-in-action.

...In the thick of classroom action teachers should be constantly thinking about why and what they are doing while they are doing it; constantly considering alternatives to their aims and methods, constantly being prepared to alter their course mid-stream; constantly reflecting on the significance of student behaviour and constantly taking into consideration alternative interpretations of what is going on with students, socially and psychologically in their learning of subject matter (van Manen in Newman, 1996: 297).

Therefore teachers and learners have to grapple with real questions that emerge directly from their work and then effect changes or take action and thus become reflexive practitioners (van Harmelen, 1997; Newman, 1998). This understanding is related to what Schon (1983) calls reflection-in-action [refer to chapter two]. In a constructivist classroom teachers and learners should be continually in the process of self-questioning and self-renewal. It is a recursive process that informs the way forward in the teaching and learning process (van Harmelen, 1997). Drawing on Dewey's blueprint, reflective teaching opposes "routine action" which is guided by "tradition, habit and authority and by institutional definitions and expectations" (Pollard and Tann in Parker, 1997: 31). Teacher 2 shows an understanding of what reflection is and is also able to reflect as we have seen from the workshop commentary. He is also more confident with the subject. This shows, in a small way,

that there is correlation between reflection and knowledge of and about the subject (Prawat, 1992). This is re-emphasised by van Harmelen (2000 b) when she states that teachers can only reflect if they understand why they do what they do. To be able think this way, teachers need to be informed about the theory on which constructivism is based (*ibid.*).

5.2.7. Group work as a teaching strategy is used without understanding how, when and why it is used.

They are able to apply collaborative (and individual to some extent) approaches in the form of group work. In fact in all the lessons but two that were observed group work with class activities was used.

Group work involves more than just getting into smaller groups. Cooperative efforts result in participants recognising that all group members share a common fate (Johnson and Johnson, 1994). Class members are split into smaller groups, like all four teachers are doing. Then they learn the assigned material and every member of the group should master the assignment. They also make sure that everyone in the class has mastered the assignment (*ibid.*). In this way learners are given the opportunity to share alternative views. The goal of group work is to develop, compare, and understand multiple perspectives on an issue (Bednar, *et al*, 1992). Put simply, it is a situation where learners work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem solving activities (Wilson in Murphy, 1997). The teacher creates an environment, which emphasises meaningful and authentic activities that help the learner to construct understandings and develop skills relevant to problem solving (*ibid.*).

In order to develop understanding and skills time is required. It cannot be done in ten minutes like T1 is doing. Which seem to show a lack of understanding of how group work can facilitate learning. Depending on the activity and availability of resources the teacher may structure the class so that they either work in groups, pairs or individually. She can also use both strategies within one lesson, like T2 did in lesson 2. It all depends on the goal (Johnson and Johnson, 1994).

5.2.8. Some teachers seem to equate teacher talking with teacher telling.

Teacher talking is not bad and should not be equated with teacher telling (van Harmelen, 2000 b; McDermott, 1993). The teacher is an important part of the learning process and we do not expect her to behave like a fly on the wall but must be involved in guiding the learners. This involves talking, prompting learners so that they can make meaning of what is being discussed. Teacher telling is based on the traditional philosophy of teaching where it is believed that facts can be transmitted from the teacher to the learner (van Harmelen, 2000 b)

5.2.9. The learners' perception of learning and teaching is not recognised.

As we have indicated in chapter two, we cannot educate intelligently if we do not know what it is we are educating (Garrison, 1998). We therefore need to give more consideration to how learners interpret their role and define learning (Crebbin, 1999).

In the data the learners stated it in no uncertain terms that they want to hold things, work, and have control over their learning. And that they learn from each other and not only from the teacher. The teacher should facilitate and scaffold. The learners want to practice things, of course with the teacher's "guided participation" (Rogoff in Wood, 1998).

Learners have also mentioned a very important element that facilitates meaningful learning; *"the more we talk and put our suggestions the more we understand. This type of teaching makes us feel confident so that we can improve our English. Also teachers...see which parts we know and which parts we do not know in order for them to help us"*. To these learners English is a third language and it is, therefore, crucial that they master the language early. "Language informs thought and thoughts come to life through language" (Wink, 2000: 99). Language develops cognition, words turn into thoughts and thoughts turn into more words (Wink, 2000). Yet there is no evidence in the data to suggest that the learners' overall understanding of a learner-centred education is recognised by the teachers.

5.2.10. In most cases teachers are able to facilitate but fail to scaffold.

This was more evident in areas where teachers themselves had problems with the content. This may suggest a correlation between subject knowledge and scaffolding. Without a sound knowledge of education in general and subject knowledge in particular, teachers will remain transmitters of prescribed information (van Harmelen, 2000 b).

Scaffolding is a process of moving the learner from a lower level of understanding to a deeper level by demonstrating, explaining or modeling what has to be learnt (van Harmelen, 2000 b). The teacher must understand that learning involves minds, that is, thinking and active mental engagement (Brodie, 2000). It is thus expected that the teacher will challenge learners to either construct models or at least ponder the merits of alternative and better models (Posner *et al* in Perkins, 1992). This means that the teacher will challenge the learner's thinking so that she (the learner) can gradually construct an understanding of what is being taught. Unfortunately, the teachers who participated in the research are products of a scientific view of teaching where, appropriate scaffolding was not part of the repertoire of teacher development (van Harmelen, 2000 b). This and classroom size make scaffolding difficult to implement in class (Perkins, 1992). This suggests that these teachers need sound understanding of the theory that informs constructivist epistemology as well as good knowledge of the subjects they teach for them to be able to scaffold.

5.2.11. There is no connection between classroom activities and the outside world.

T4 for example underplayed the effect that alcohol has on the lives of people in her lesson. Yet the region has one of the highest statistics of alcohol abuse in the country. T1 did not connect the use of contraceptives to what is happening in the region. The high birth rate, high unemployment, the influence of religion, traditional versus western medicine, the high rate of HIV infection, etc. are all issues that are connected to this topic. It is a big and very important topic that should cover a lot of teaching time. It cannot therefore be completed within a single period and expect learners to understand its implications. Learners were willing to discuss these issues but did not get the support from the teacher. She did not listen with a critical ear (Wink, 2000).

School learning should be authentic and connected to the world outside of school. Learning is social act (Prawat, 1992), and should not be seen as something that is only confined to the classroom because of society in general plays a role (van Harmelen, 2000 b). This understanding will not only make learning more interesting and motivating to the learners, but learners will get the opportunity to use and develop knowledge in real world settings (Shepard, 2000).

5.3. Summary.

Teachers have a general understanding of a learner-centred approach, but the information occurs in ‘bits’ and ‘pieces’. The central findings discussed above are all elements of a learner-centred education. Teachers have shifted into a learner-centred education in some areas but are still carrying the traditional baggage in some areas. Teachers do not address emergent issues from their teaching, and do not therefore reflect-in-action.

The examination controls the curriculum. What is taught how it is taught and the pace at which it is taught all point towards satisfying the demands of a high stakes examination. These are all features of the traditional curriculum (Wilmot, 2000).

Teaching is activity based. However there is a disagreement on the role of group work. Some of the teachers believe that it speeds up teaching and some believe that it slows down the coverage of prescribed work. On the other hand school managers have the same understanding of the learner-centred approach as their teachers. This then suggests that the status quo will prevail because teachers do not receive constructive guidance. The findings will be compared with similar studies done in Namibia and South Africa. In this way we will be able to fit the teachers in this research into the bigger picture.

CHAPTER # 6

RESEARCH FINDINGS.

6.1. Introduction.

Firstly this chapter tries to locate the findings (refer to chapter 5) of this research into context. I am aware that in education research the knowledge produced is always bound up in specific contexts and here-and-now judgements. I am also aware that educational knowledge can never become a system of accumulated certainties and that the authority of educational research should always remain open for scrutiny and to question (Luckett, 1996). However the findings of this research are not isolated and unique but together with related research done in South Africa and Namibia one can begin to put together a general picture of the current Namibian education reform process. Bassey (in Adler and Reed, 2000) calls this kind of interpretation “fuzzy generalisations” while Stake (1995) calls it “naturalistic generalisations”.

Secondly the chapter highlights the limitations of the research, recommendations for further research and lastly a conclusion.

6.2. Similar research findings.

* Pomuti (2000: 91) did a study of “the impact of a practice-based inquiry in-service teacher education model on teachers’ understanding and classroom practice”. The findings of the study indicate moderate correlation between teachers’ understanding and classroom practice, a low correlation between teachers’ understanding and reflection, and a negligible correlation between classroom practice and reflection.

* Wilmot (2000) in an evaluation of Namibian Life Science learning support materials, found that all teachers observed used activity-based learning. The teachers are able to plan and implement these activity-based lessons. However the majority of them use the activities in a procedural way. They involve and keep learners busy without necessarily explaining the purpose of the activity and without including a debriefing session. The other finding is that the teachers teach towards an examination that places heavy emphasis on factual recall and memorisation of content. However a

shift has taken place from a traditional, teacher-centred approach to an activity-based approach.

* Adler and Reed (2000: 221) in a study of teacher's 'take up' from a formal in-service professional development programme, found widespread 'take up' by most teachers of group work, and hence increased possibilities of learning from talk. However most teachers did not complement or support this shift to learning from talk with strategies for learning to talk.

* Pile and Smythe (in Taylor and Vinjevold, 1999) in the study of classroom practices found a disparity between theory and practice. In pre-lesson interviews teachers quoted discovery, building on prior knowledge, working in groups etc. as the way children learn. However in the classroom, learners were never given the opportunity to discover, no evidence of building on prior knowledge, it was whole class teaching. All indications are that these teachers have accepted the desirability of learner-centred pedagogy, but are unable to practice it.

* In the SAIDE study (in Taylor and Vinjevold 1999), promoting participation through group work, the study found that group work was understood to be the only way in which participation could be promoted. The teachers seem to assume that once learners are in a group, participation and learning will occur automatically.

6.3. Limitations of the study.

As a novice researcher I did not expect a smooth ride in this research study and it was not. Part of it was due to lack of experience and could have been avoided. The others were constraints beyond my control. What gives me peace of mind are the lessons that I have learnt along the way. These are the lessons I would like to share with the reader.

* First I selected two of the oldest schools in the region as my research sample. They are not very far from each other and they have the gender composition I was interested in. The first school has two Biology teachers, a male and a female. The second school has two female teachers. I have learnt

from my advisory work that female teachers will talk freely when they are in majority, it is a cultural issue. I had visited both schools in January and talked to the teachers where I expressed my interest in conducting my research around them if everything went according to plan. After my research proposal I decided with the help of my supervisor to write letters of request to enter the scene. These were sent through the senior advisory teacher. The first mistake that I made was not to confirm whether everything was as per January agreement. When I arrived at the first school they were ready for me to prepare the program with them. At second school I found that the teacher had gone on accouchement leave the week before I arrived. This necessitated a change of plan, which had to be done without wasting time. I went to another sister school, which has two female teachers as well and fortunately they were willing to participate in the study. Most of the school inventory data come from this school.

* The other problem was observer 2. It proved very difficult to accommodate my program into his because his had been confirmed and his teachers were already informed about the dates that he would be visiting their school clusters. Fortunately he managed to squeeze me in but this meant that I had no room for follow up on emergent issues during the interviews and lesson observations. This is the reason why I observed T2's Lesson 2 alone. The second observer had left that morning to fulfill his program. I could not let this lesson go because we were supposed to observe three consecutive lessons so as to establish coherence.

* The principal of School A proved to be another stumbling block to overcome. It took three appointments for me to finally interview him. This time I went to make the fourth appointment and decided to break the ethical cord by interviewing him there and then. He was polite and apologised so I took advantage of the situation.

* There are gaps in the research that I should have been filled. I was not able in my interviews and workshop to follow up on certain questions in order to get clarity. I thought some of the issues were not important then. But I came

to realise their importance during the data analysis. The problem here is that I concentrated on my semi-structured interview schedule and could not see some of the issues that emerged from the interview. This shows the inherent difficulty of using interviews as data collecting tools. The other problem that I was not able to transcribe and send transcriptions to the respondents because of the distance and the time factor. As result the interviewees did not reflect on their interview sentiments as expressed in this research. However, there is no guarantee that they would have changed their sentiments.

* I did not play my recording immediately after interviewing T3 and T4. Their voices are therefore not part of this study because they were not audible enough for me to transcribe. Fortunately I have everything else on T3 though I miss T4's reflections on her lessons because she did not attend the workshop for reasons that I have already spelt out in chapter three. It is unfortunate because they would have added another dimension to my understanding of the situation. I gave the radio cassette to the School of Journalism who were willing to help but unfortunately they could not boost the recording because the original recording was very bad.

* We had to move T3's second and third lessons to later dates because she could not come to work due to a toe operation. Research subjects have lives of their own and these unforeseen circumstances should be planned for in the research time frame. Mine was too tight.

* The study is just a snapshot of the larger picture and because of the nature of case studies we cannot generalise the findings.

* Lastly, how do you explain to your family that they should give you time to gather information when you have been away from home for six months? They might understand but will surely love to have a share of your attention. This actually meant that I could not work on my data while I was at home and this added to the transcription dilemma.

6.4. Recommendations for further research.

This study has identified a few areas that need further research.

- Is activity-based teaching learner-centred teaching?
- Can the learner-centred approach and the high stakes examination co-exist?
- How can reflexivity be integrated into in-service professional teacher development?
- Are current syllabus content demands and the learner-centred approach to teaching and learning a mismatch?
- Deliberate efforts to ensure that the teacher understands the theoretical underpinnings of a learner-centred education. Whose responsibility is it?

6.5. Conclusion.

In the first instance I have based my argument on the assertion by Enslin (in Taylor and Vinjevoold, 1999) that Fundamental Pedagogics headed off the possibility of critical reflection on that system by making reflection illegitimate (refer to chapter two). On the other hand constructivism demands that the teacher should reflect or look at what she is doing. According to Pallard and Tann (in Parker, 1997) reflective teaching involves a willingness of the teacher to engage in constant self-appraisal and development. This implies flexibility, rigorous analysis of what the teacher is doing, and social awareness. I can, therefore, assume that elements of reflection and reflexivity that we have seen in this study represent a shift from a teacher-centred education towards a learner-centred education.

In conclusion I would like to state the difficulties involved in this paradigm shift by borrowing thoughts from Wink (2000) and Splitter (1991).

Social constructivism describes a learner-centred classroom as an environment where the making of knowledge is interactive and collaborative, where multiple perspectives are presented, and where issues that emerge from the lesson are valued. However, the thoughts of constructivist pedagogy take time to understand. Critical reflective practice takes time and effort. Learning to challenge our own intellect takes time and we have to be patient. Shifting our lesson designs and teaching in a learner-centred

way also takes time. Shifting into a new paradigm altogether really takes time. We are still driven by pedagogy of coverage, we have to cover this now and we have cover that next before the examination. Coverage is not the goal of education but learning is, teachers in this study have said this much. Learning and teaching strategies come and go but critical reflection in and outside the classroom remains the “corner-stone of education” (Splitter, 1991). Why should teachers reflect if the teacher support services couldn’t? Why should learners reflect if the teachers couldn’t? The learners and the future matter, “and it is through changing the present that we make the future” (Freire in Wink, 2000). We have to learn, understand and challenge the existing high stakes examination because “power concedes nothing without demand. It never did, and it never will” (Douglass in Wink, 2000). Whether we like it or not the changing world is dragging us, kicking and screaming, facts and all, into a transformative model of education.

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APPENDICES.**APPENDIX 1: LESSON OBSERVATION SCHEDULES.****SCHOOL: A.****TEACHER: 1.****LESSON: 1.**

Date: 7/6/2001 (Thursday).

No. Of learners in class: 29.

Grade: 10 B.

Lesson duration: 40 minutes.

Lesson Topic: Chromosomes and genes.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
9:10 to 9:50	<p>“Today’s lesson is about chromosomes and genes” the teacher began.</p> <ul style="list-style-type: none"> - Gives learners topics to discuss in groups. Some groups discuss chromosomes while others discuss cell division. - Teacher moves around telling (by name) specific learners to get involved. - Asking for feedback after ten minutes or so. - Then she starts asking questions on inheritance and characteristics that are inherited - Then she starts talking about meiosis. Draws a 	<ul style="list-style-type: none"> - Discuss in groups. - Reading from their textbooks. - Give feedback: first a girl followed by another girl then two boys, a girl and a boy. The learners are in six groups of five. 	<ul style="list-style-type: none"> - Two learners were late for about three minutes and the teacher did not say anything. - I don’t know whether the lesson was introduced before because the learners started talking to each other in no time at all. - The discussions in groups took more or less ten minutes but I could sense from the learners’ reaction that they needed more time to discuss before giving feedback. - Learners have problems in differentiating somatic cells from sex cells. - From their feedback I could see that they were trying to regurgitate word for word from the textbook. This could be attributed to either lack of understanding, a weak command of the

	<p>sketch of the meiotic cell division and explains what is happening in the sketch.</p> <ul style="list-style-type: none"> - She draws the sketch of the mitotic cell division on the chalkboard and explains the difference between the two cell divisions. - Defines the gene reading from the textbook. - Gives homework to the learners to define: chromosomes, genes, mitosis, meiosis and inheritance. 		<p>language or both.</p> <ul style="list-style-type: none"> - This is proving to be a difficult topic, which requires more hands on activities –a chat show, will not help much. - The teacher does not seem to know which area to focus on. She is covering a lot of content that will confuse learners even more. There is no proper mention of chromosomes and a definition thereof was only mentioned about two minutes from time.
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By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
	<ul style="list-style-type: none"> - Introduced the topic. - Gave subtopics for group discussions. - Checked to see whether groups were discussing. - Asked one member from each group to give feedback. - Asked questions on characteristics learners could have inherited from their parents. 	<ul style="list-style-type: none"> - Discussed subtopics in groups of five. - Gave feedback on group discussion: one member of each group gives an oral report to the class. - Answer teacher's questions. - To do written 	<ul style="list-style-type: none"> - Had the topic been taught before? - Went around the groups asking "are you discussing?" which is not very helpful to the learners - Guidance to learners: very little. Would have liked to see the teacher giving guiding questions on the topic for learners to find answers to the major learning points of the lesson. - Could have used more examples outside those mentioned in the textbook.

	<ul style="list-style-type: none"> - Wrap-up questions followed by a short presentation of mitosis and meiosis. - Gave questions for learners' written homework. 	homework.	
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By lesson observer 2.

SCHOOL: A.

TEACHER: 1.

LESSON: 2.

Date: 8/6/2001 (Friday).

No. Of learners in class: 27. Grade: 10 A.

Lesson duration: 40 minutes.

Lesson Topic: How sex is determined.

Time.	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS.
11:40 to 12:20	<ul style="list-style-type: none"> - "A boy or a girl"? - Tells learners to discuss in groups for ten minutes. - Listens to feedback. - Leads the class through meiotic cell division and fertilization. - Gives examples many of them from learners' feedback. - She asks "why" questions. - Teacher explains that females will always produce egg cells and males sperm cells. 	<ul style="list-style-type: none"> - Some groups should discuss "boy or girl"? And the rest dominant or recessive. - Start giving feedback after five minutes. - Every group mentions eye colour as an example during their feedback. - Able to answer leading questions but fail to answer 	<ul style="list-style-type: none"> - It looks like these activities are in the textbook because the learners start referring to them. - There are no proper instructions given and five minutes is hardly enough for a meaningful discussion. - Giving specific readings as homework is better than rushing over the content. - I am not convinced that these learners understand what is happening looking at how muddled the lesson is. - I feel the teacher is chewing too much. - This is a black class therefore eye colour for starters does not make sense. - No mention of who determines the sex of the baby given the understanding of

	<ul style="list-style-type: none"> - The teacher refers a question to the researcher. 	<p>why and how questions.</p> <ul style="list-style-type: none"> - Asking questions related to fertilization. - “How do you show co-dominant genes through a sketch?” one learner asks. 	<p>the community where mothers are blamed for continuously producing baby girls. This needs proper interrogation.</p> <ul style="list-style-type: none"> - Learners are willing to engage the teacher but she is found wanting.
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By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
	<ul style="list-style-type: none"> - Introduced the topic for the day. - Gave group discussion task. - Monitored – moved from one group to the other. - Facilitated the feedback after the group discussions. - Gave a short presentation to clarify points including sex determination. Used questions to facilitate presentation. - Facilitated the question and answer session. 	<ul style="list-style-type: none"> - In groups discussed the terms: dominant, recessive and co-dominant. - Gave feedback. - Answer questions from the teacher during the short presentation. - Asked questions for clarity. 	<ul style="list-style-type: none"> - The topic and the actual subject of the discussion, and hence the feedback not exactly the same: all groups concentrated on dominance and recessive. - The teacher did touch on sex determination in a short presentation. - NB: Group discussions a little more directed in the sense that the learners were given the key terms to discuss.

By lesson observer 2.

SCHOOL: A.

TEACHER: 1.

LESSON: 3.

Date: 11/6/2001 No. Of learners in class: 27. Grade: 10. A. Duration: 40 minutes.

Lesson Topic: Concepts related to genetics? (The lesson topic not indicated)

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
11.40 to 12:20	<ul style="list-style-type: none"> - Asking questions on the previous lesson. - Groups should discuss genetics, continuity, variation, inherited characteristics and acquired characteristics. - Moving from group to group and talking to group members. - Asking questions like, what characteristics do we share as a human race? Do you look like your brother, why? - Asking questions on environmental influence on inherited characteristics and answering most of the questions herself. - Can this be inherited (pointing at a mark on her own forehead) and why? 	<ul style="list-style-type: none"> - Answering questions. - Each group discusses one concept. - In groups seek clarification from the teacher. - Feedback based on facts straight from textbook (trying to recite what they read from the textbook) - Some learners say no to the questions by teacher while others say yes but both fail to say why. - Tell the teacher that the human race has two eyes, two ears and two legs. 	<ul style="list-style-type: none"> - I don't think this kind of teaching is effective because learners are given too much to do in one lesson. - Perhaps she must reflect on what and how she is teaching and vary her methods and classroom arrangement. It is kind of boring routine lesson presentations. - Dogs have a pair of ears and eyes yet they are not humans. This should have been discussed with the learners so that they build an understanding of what they are talking about. - There is generally better learner-teacher and learner-learner interaction than was in the previous two lessons we have observed. - The teacher's why question on variation is a probing question and she gives the learners time to give their various answers. From their answers I could see how ineffective the previous lessons were. Learners start confusing concepts like co-dominance, inherited characteristics and genes. - The teacher does not seem to realize it at least for now. It will be interesting to see what happens in the next lesson.

By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
11:40 to 12:20	<ul style="list-style-type: none"> - Gave out terms for group discussion: continuity; genetics; variation; inherited characteristics and acquired characteristics. - Facilitated the feedback. - Consolidation by the teacher. 	<ul style="list-style-type: none"> - Each group discussed one of the terms. - One member from each group gave feedback. - Answered questions during presentation 	<ul style="list-style-type: none"> - The teacher should have given more guidance to the group discussions through questions or by simply highlighting the areas that each group should focus on under each term.

By lesson observer 2.

SCHOOL: A

TEACHER: 1.

LESSON: 4.

Date: 14/6/2001 (Thursday).

No. Of learners in class: 27. Grade: 10 A

Lesson duration: 40 minutes.

Lesson Topic: Family Planning and Contraceptives.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
7:50 to 8:30	<ul style="list-style-type: none"> - "From your own experience what is family planning?" the teacher starts the lesson. - She would like to know whether it is only meant for the married. - Would like to know their experience of traditional contraceptives. 	<ul style="list-style-type: none"> - Give answers to questions. - Very interested in the topic. - Identify some contraceptives brought by teacher to class. - They would like to know the 	<ul style="list-style-type: none"> - The teacher is giving learners enough time to express their views and experiences on the use of contraceptives. - Only the definition of family planning was mentioned. The pros and cons were never discussed. - I feel that the learners were left in suspension as far as the link between traditional and western contraceptives

	<ul style="list-style-type: none"> - Asking leading questions. - Giving the names of different types of family planning tablets that women use. - Telling the learners the names of the hormones found in these tablets - Would like to know how these hormones can prevent pregnancy. 	<p>relationship between Religion and the use of contraceptives.</p> <ul style="list-style-type: none"> - Some believe that using a condom is killing. - One learner tries to explain that the embryo is not yet formed therefore it is not killing. - A boy would like to know whether a woman could menstruate while on the pill. 	<p>is concerned.</p> <ul style="list-style-type: none"> - How to use a condom – the understanding of sexual intercourse and penetration is not clearly conceptualised. - I feel that the teacher was uncomfortable with building the bridge between traditional beliefs, religious beliefs and scientific knowledge over the use of contraceptives. A discussion over this issue could have helped the teacher to understand the misconceptions that learners might have and then address them. - Although this is a better lesson than I have seen from her so far, she seems to be teaching for examination rather than convincing the learners on the importance of using contraceptives. How will they use them if they feel they would be committing murder. - She is still covering too much in a single period. - * There was no mention of concepts related to genetics from the previous lesson.
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By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
7:50 TO 8:30	<ul style="list-style-type: none"> - Presented the lesson by asking questions. - Provided examples of contraceptives to the class 	<ul style="list-style-type: none"> - Answered the teacher's questions. - Identified the 	<ul style="list-style-type: none"> - About three minutes of the lesson were wasted at the start of the lesson because the data collectors went to the wrong room.

	e.g. condoms, the pill, etc. - Allowed learners to ask questions that were answered by the other learners.	different types of contraceptives. - Explained how the different types of contraceptives are used - Asked questions.	- I like the idea of starting at the level where the learners are: asking them what they understand about family planning. - Learners were free to voice opinions on this topic. - Lesson presentation through question and answer method. - The teacher had brought different types of contraceptives and could have let the learners practice putting condoms on model/plastic penis or even on bananas.
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By lesson observer 2.

SCHOOL: A.

TEACHER: 2.

LESSON: 1.

Date: 2/7/2001

No. Of learners in class: 10.

Grade: 11 A

(HIGCSE).

Lesson duration: 40 minutes.

Lesson Topic: Transport in Plants.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
9:10 to 9:50	- Asking about the principles of water movement based on the previous lesson of Osmosis. - Explaining what potential is. - Explaining the relationship between potential and water pressure. - Shows the direction of water movement from the soil to the root hairs by drawing a sketch on the	- Answering questions. - Write chalkboard summary. - Listening to the teacher or are they? - Answer	- The teacher is generally giving information and asking 'what' questions at the same time. - The teacher tells learners that spinach would show better results than the safranin he is using but does not ask the learners why.

	<p>chalkboard and by an experiment already set by him.</p> <ul style="list-style-type: none"> - Tells learners to add the hydrostatic pressure left from previous lesson. - Demonstrate the principle of transpiration pull – explaining cohesion and formation of a water column by using the learners as examples of water molecules (hands held together) and by way of a sketch on the chalkboard. - Gives the learners stains to take home and set similar experiments by using papaw and spinach and bring to class the following day. 	<p>questions during the evaluation phase.</p>	<ul style="list-style-type: none"> - He is giving learners the opportunity to say something but he intervenes before they can say anything although this is a higher-grade class. - He is concentrating on the key concepts, which is fine but he is giving too much information in one lesson. - * I would love to see the next two lessons to see whether there will be application of these concepts.
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By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
9:10 to 9:50	<ul style="list-style-type: none"> - Started the lesson with the review of Osmosis by leading a question and answer session. - Gave extended explanations aided by a sketch on the chalkboard. - Brought a plant in a beaker with red stained water to help show the movement of water through the plant. - Presented new information to the class with the aid of drawings 	<ul style="list-style-type: none"> - Gave answers to the questions asked by the teacher during the review. - During the presentation the learners either made notes or simply listened to the teacher. - Learners became learning/teaching aids when they were made to 	<ul style="list-style-type: none"> - Where learners had some trouble in explaining the process the teacher gave extended explanations. - Learners generally passive (just listening) during the presentation, except for one or two questions to check their understanding. - For consolidation: learners were asked questions on what had been covered during the lesson. - To prove the movement of water through the plant the teacher asked learners to test different plants with stained water over night.

	<p>on the chalkboard.</p> <ul style="list-style-type: none"> - Demonstrated the effect of transpiration pull with drawings and also using the learners as water molecules - Helped learners to write notes by telling them what to write and giving the summary framework for the lesson and key words. 	<p>represent water molecules.</p>	
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By lesson observer 2.

SCHOOL: A.

TEACHER: 2.

LESSON: 2.

Date: 3/7/2001

No. Of learners in class: 10.

Grade: 11 A

(HIGCSE).

Lesson duration: 80 minutes.

Lesson Topic: Observation and Identification of cells associated with water transport in Plants.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
8:50 to 9:30	<ul style="list-style-type: none"> - Goes over the theory related to transportation in plants. - Gives instructions on the activities learners will do, that are, making a cross section of root, stem and 	<ul style="list-style-type: none"> - Show the teacher the experiments that they set over night as part of their homework. - Start cleaning apparatus for the lesson's activities. 	<ul style="list-style-type: none"> - Learners brought already set experiments and they used some of the plants for the lesson's activities. - They have eight microscopes but some decide to work together; a pair, and a boy and a girl work as

	<p>leaf. Then observe xylem vessels, phloem cells, root hairs, vascular bundle, endodermis and cortex.</p> <ul style="list-style-type: none"> - Goes around and talks to learners. - Glances into their microscopes and commends a pair of girls who have managed to locate the vascular bundle. - Encourages the rest to do the same and tells the pair of girls to draw what they see. - Tells learners to pay attention to the diameter of the xylem vessels, as this will have an influence on its capillarity, which they will learn later. - Asks them the features that enable them to identify the xylem vessels. - He asks the learners whether they will be able to prepare similar specimens in the examination. - Summarizes what learners have been doing. 	<ul style="list-style-type: none"> - Some are working in a group, a pair and as individuals. - One learner invites the teacher to come and see what he is observing – teacher tells learner to isolate a particular part by using a pin. - Continue to invite the teacher to come and comment on what they are observing. - The bigger group (four members) is struggling to make a good slice. Later they manage to do so and are delighted. - Some learners are arguing about what it is they can see - In the bigger group a girl is explaining to the other three. - They invite other learners to see what they managed to isolate. - Pack microscopes after cleaning them. 	<p>individuals.</p> <ul style="list-style-type: none"> - They have the luxury of moving around because there is enough space and enough microscopes. - The teacher was giving the necessary attention and encouragement. - One girl is very excited and calls the teacher who confirms that she is observing the xylem vessels and other cells that have not been introduced to them, those are the parenchyma and collenchyma. - The learners are using ordinary paper to draw. Drawing books would have been handy. - There seems to be a good relationship between the teacher and the learners and between the learners themselves. - I was also able to observe what the learners were observing. - It is a good lesson but I feel it could still be more focused.
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By the researcher.

SCHOOL: A**TEACHER: 2.****LESSON: 3.**

Date: 5/7/2001.

No. Of learners in class: 10.

Grade: 11.

A. (HIGCSE).

Lesson duration: 40 minutes.

Lesson Topic: Transport in Plants – Capillary theory.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
10:20 to 11:00	<ul style="list-style-type: none"> - Reviews the previous lesson by explaining what happened. - Introduces the capillary theory - Shows the apparatus they will use to demonstrate capillary. - Compares the straws to the xylem vessels and beaker with water to the root hair region. - Determines the diameter of one straw by aid of a graph paper. - Explains the principle that the narrower the straw the higher the water will rise. - Demonstrate capillary and does the measurement and gives readings together with the learners. - Tells learners to do the 	<ul style="list-style-type: none"> - Answer questions - Sit in one group around a table. - Watching and listening. - Start finding diameters of different straws. - Demonstrate capillary and take measurements and readings arguing with each other all the while. - Give feedback - Go over the activity again. - Complaining that they are getting results that do not confirm the principle. - Suggesting reducing the amount of water in the beaker and going over the activity again. Still wrong results though. - Suggest that they should have used similar straws 	<ul style="list-style-type: none"> - Initially the teacher is doing most of the work and explaining at the same time. - Learners seem to have little problem in determining the diameter of straws. - Learners could see that they had wrong readings and they want know why. They are talking about it, suggesting possible reasons and going over the activity again - While the learners are struggling the teacher is standing about three meters away. He seems to be enjoying what is happening. - The results are still defying logic. - The teacher would like to know from the learners what went wrong. - They vow to try it again.

	<p>same with various straws of different diameters.</p> <ul style="list-style-type: none"> - Demands feedback - Writes feedback on the chalkboard. - Goes through the summary and compares the readings to the capillary principle. - Tell the learners to go over the activity again. Guides the learners - Tells them that they will go over the activity again the following lesson. 	<p>and not a combination of plastic and glass because this may have different effects on capillary.</p>	<ul style="list-style-type: none"> - * It is a lively session but the time is too short.
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By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
10:20 to 11:00	<ul style="list-style-type: none"> - Presenter, demonstrator, facilitates and leads 	<ul style="list-style-type: none"> - Observers and listeners - Try what teacher did for them. - Involved practically in measuring water level in tubes 	<ul style="list-style-type: none"> - Difficult proving the capillary theory by using different sizes of tubes/straws. - Instead of height being less for wider tubes it was actually either the same or more than that of the narrower tubes.

By lesson observer 2.

SCHOOL: B.

TEACHER: 3.

LESSON: 1.

Date: 7/6/2001.

No. Of learners in class: 18

Grade:

12.

Lesson duration: 40 minutes.

Lesson Topic: Plant Nutrition: internal structure of the leaf.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
12:40 to 13:20	<ul style="list-style-type: none"> - Asks one learner to be in charge of this revision lesson. - Rephrasing learners' questions - Tells learners to organize their ideas - Takes over after twenty minutes and leads the class through the internal structure of the leaf with the aid of a chart - She is asking "why" and "how" questions. 	<ul style="list-style-type: none"> - One learner goes in front and starts asking prepared questions to the class on the internal structure of a leaf. - The lead learner is following on some of the answers his fellow learners are giving. - Some learners believe that food is stored in the form of glycogen in tubers - A girl struggles to give the photosynthesis equation on the chalkboard but the class is helping her. 	<ul style="list-style-type: none"> - She tells us that it is a revision lesson for an extended paper. - She has biological pictures, charts and models on the walls of her class. - The activity gives learners an opportunity to talk but boys are more dominant than the girls (there are ten girls). - Learners seem to have a general understanding of the topic but have a misconception of the difference between starch and glycogen. Unfortunately the teacher does not pick it. - She could have introduced the chart earlier as this could have made the discussion easier. - Should have pushed the girls a lot harder.

By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
12:40 to 13:20	<ul style="list-style-type: none"> - Facilitates revision of previous lesson. - Helps learner facilitator by asking questions leading to the answers. - Provides the graphic materials (teaching 	<ul style="list-style-type: none"> - One learner asks questions on previous lesson while - Other learners answer the questions by describing the structure or process asked about. 	<ul style="list-style-type: none"> - Interesting to see the teacher just setting up the revision slot while a learner facilitates it. - The teacher' role during the revision stage is very minimal. - Most learners (if not all) were prepared to give longer answers or descriptions of processes.

	aids in the form of charts).		
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By lesson observer 2.

SCHOOL: B.**TEACHER: 3.****LESSON: 2.**

Date: 2/7/2001.

No. Of learners in class: 17.

Grade: 12.

Lesson duration: 80 minutes.

Lesson Topic: Revision? (Was not indicated).

Time	TEACHER'S ROLE.	LEARNERS' ROLE	COMMENTS
8: 10 to 9:00	<ul style="list-style-type: none"> - "Take out the question papers and exchange workbooks" she said. - Tells learners to start reading the first question and also read the answers in front of them. - Leads learners in explaining and defining concepts like "magnification". - Invites learners to show on the chalkboard how they worked out some questions that involved a bit of calculations. - Asks one learner to measure a part of a magnified drawing. 	<ul style="list-style-type: none"> - Exchange workbooks - Start giving answers to the questions. - Two boys start working on the chalkboard to show the rest of the class how they worked out the answer. - Asking questions and disputing some of the answers colleagues are giving. - They give varying measurement readings (in mm and cm). 	<ul style="list-style-type: none"> - It looks like they were supposed to work on these questions over the weekend – but I am not convinced that they all did judging from their level of participation. - Learners have problems in reading and understanding some of the questions. - One later is late for about twenty minutes and claims to have been with the principal but the teacher refuses to allow him in. - Most learners are involved but I would like to see more girls involved, they are in majority after all. - Learners are showing inability to read measurements and convert millimeters to centimeters and vice-versa. - Will these learners be able to answer similar questions in the examination? <p>* The observers leave after fifty minutes as agreed with the teacher earlier.</p>

By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
8:10 to 9:00	<ul style="list-style-type: none"> - Asked learners to take out question papers they were given the previous Friday. - The teacher checked the answers given by the learners to see if learners had done their work. - The teacher proceeded to go through the questions one by one. - Amplified any of the answers given by the learners when there was a need to do so. - Helped learners' workout some of the problem questions. 	<ul style="list-style-type: none"> - Learners produced the papers and the answers to the two questions they were asked to deal with. - Gave oral answers to each question as they went through the question paper. - Also worked out another question on the chalkboard. 	<ul style="list-style-type: none"> - The lesson was aimed at training the learners for the examination by going through questions from an old examination paper. - It is probably because of the above that there was no lesson topic. - Learners do not seem to know how to measure and convert from centimeters to millimeters. - Where learners gave differing answers the teacher did not clear the issue as to what is correct. - *The lesson started about ten minutes late.

By lesson observer 2.

SCHOOL: B.

TEACHER: 3.

LESSON: 3

Date: 5/7/2001

No of learners in class: 17.

Grade: 12

Lesson duration: 40 minutes.

Lesson Topic: Testing a leaf for starch.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
12:40 to	<ul style="list-style-type: none"> - "Take out your workbooks you will complete your 	<ul style="list-style-type: none"> - Start writing out instructions to the 	<ul style="list-style-type: none"> - It seems as if the drawing is from the previous lesson.

13:20	<p>drawing later” she began.</p> <ul style="list-style-type: none"> - Told learners that she had already prepared the experiment because her source of heat is slow. - Asked why they think they are testing the leaf for starch - Asking them questions related to what the conclusions will be at end of experiment. - She reminds them to go back to the enzyme topic when they fail to answer a question. Then gives them the answer. - Picking up a test tube she tells them to write down what they see or observe. - Invites a learner to go and feel the leaf in question. - Invites learners one by one to observe what happens to the leaf when covered by iodine solution and write their observations and conclusion. - Tells them the colour change. - Tells them to answer end of the experiment questions in their workbooks. 	<p>experiment from the chalkboard.</p> <ul style="list-style-type: none"> - Answering oral questions. - Failing to answer end of experiment test – all of a sudden they are very quiet. - Some learners start trying after leading questions from the teacher. - Write own observations. - A volunteer drops iodine solution on the leaf. - They observe the colour changes and write down their observations and conclusions. - Some learners fail to identify the colour. - Giving feedback on colour change mentioning a variety of colours - Write down end of experiment questions for homework. 	<ul style="list-style-type: none"> - The writing down of instructions is taking long. A double period could have saved time or referring to the Grade 8 textbook, which outlines a similar experiment. - An afternoon where they could set the experiment themselves would have been appropriate. - What kind of observations they are writing I cannot imagine. - She keeps reminding them (or us?) that a lack of resources makes it difficult for every learner to do the experiment. - Connects this experiment with what they did earlier (did they or did she do it for them?) on food item tests. - End of experiment task has a lot of “why” questions. This is good. - * This lesson is also being observed by the Head of Department and it will be interesting to get her comments on the lesson.
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By the Researcher.

Time	TEACHER'S ROLE.	LEARNERS' ROLE	COMMENTS.
12:40	- Introduced the topic of the lesson to class.	- Wrote the procedures for the experiment.	- The learners had no input to the procedures – they simply copied down what the teacher had written on the chalkboard before the lesson had even started. The same applies to the setting up of the experiment.
13:20	- Set up the experiment and wrote the procedure on the chalkboard, living out only the observations and conclusion. - While waiting for the experiment to produce required results she asked questions to test the learners' knowledge on the reasons for certain steps in the procedure. - Facilitated the observation by asking questions. - Helped learners to reach some conclusions by asking learners questions on what can be deduced.	- Answered questions to explain why some steps were followed in the experiment. - Wrote down their observations and later conclusions. - Answer some questions written on the board to help them give/explain reasons for the steps taken to perform the experiment.	- The experiment had the feel of "done by the teacher" with the learners being mere spectators. - The exception was the last step in the procedure, which was done by a volunteer from the class.

By lesson observer 2.

The following are the Head of Department's comments on the lesson:

1. **Lesson Plan Preparation:** Well prepared no skipping. Teaching methods used were suitable for the lesson
2. **Lesson Presentation:** Learners gained immediately inside the lesson, as they were anxious to see what will happen with the leaf. All learners were actively involved throughout the lesson.
3. **Teaching /Learning Media:** All apparatus necessary for the experiment were used skillfully.
4. **Communication Skills:** the teacher was very patient and was explaining nicely to the learners every step of the experiment.

5. **Evaluation:** Learners were observing and they wrote down their own observations.
6. **General Impressions of Teacher:** Confident enough in the subject and in the experiment in particular. Class work was given.
7. **Recommendations:** The lesson was very interesting and learners were also actively involved. Keep it up.

SCHOOL: B.

TEACHER: 4.

LESSON: 1

Date: 7/6/2001.

No. Of learners in class: 30.

Grade: 10. A.

Lesson duration: 40 minutes.

Lesson Topic: Nutrition and Digestion.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
11:20 to 12:00	<ul style="list-style-type: none"> - Starts by asking questions on the previous lesson. - Asks the class whether it agrees with the answer given by a fellow learner. - Asks for a volunteer (preferably a girl) to come in front and classify a sample of food into groups. - Gives instructions to learners to work in-groups and classify the food sample into food groups (e.g. carbohydrates, proteins, fats, etc.) and give the function of each food group and state why we need food. Also mention 	<ul style="list-style-type: none"> - A learner gives an answer but the class does not agree with him. - A few more give their opinions and one learner gives an answer the teacher likes - A girl is classifying the food sample – showing the class. She is struggling but the class is behind her. - They work in six groups. - One asks whether 	<ul style="list-style-type: none"> - The teacher is engaging the learners by question and answer method. - The teacher is pushing the girl who is classifying the food sample to do a better job and asks the other learners to lend a hand. At this level I feel that these learners should easily be able to do this activity. - Some groups are too big (seven members). - I like her way of pushing girls to participate in the lesson. - The lesson topic is too wide. It represents a theme as it stands. Should have narrowed it down to “classification of a food

	<p>other food items they know belong to these groups.</p> <ul style="list-style-type: none"> - Facilitates group work by moving from group to group - Demands feedback. - Asks what growth is - She tells the class that development of new cells is repair and not growth. 	<p>they can add other food substances to the list and give functions thereof.</p> <ul style="list-style-type: none"> - Groups give feedback - One learner defines growth as the development of new cells. 	<p>sample”.</p> <ul style="list-style-type: none"> - The learners do not seem to buy the teacher’s definition of growth but she seems not to realize it as she continues with her explanations. - If she could follow on some of the answers the learners were giving this could have been a very good lesson. - She seems to run out of time in the end.
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By the Researcher.

Time	TEACHER’S ROLE	LEARNERS’ ROLE	COMMENTS
<p>11:20 to 12:00</p>	<ul style="list-style-type: none"> - Recap of last lesson through questions. - Asked learners to explain what nutrition is. - Asked learners to discuss in groups. - Facilitator in leading group discussions through guiding questions. - Asked one learner to classify the food sample into carbohydrates, proteins, fats, etc. - Check whether the groups are on track. - Wrote group responses on chalkboard. 	<ul style="list-style-type: none"> - Answered questions – one question one learner. - Classify food types - Discuss in groups using guiding questions from the teacher. - Gave feedback on discussions – each group gave feedback on only one of the guiding questions. 	<ul style="list-style-type: none"> - The teacher’s was mainly that of facilitator – she guided learners to the relevant information through questions - NB: Answers should be on board.

By lesson observer 2.

SCHOOL: B.**TEACHER: 4.****LESSON: 2**

Date: 13/6/2001.

No. Of learners in class: 30.

Grade 10. A.

Lesson duration: 40 minutes.

Lesson Topic: What happens to the food we eat?

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
12:20 to 13:20	<ul style="list-style-type: none"> - Reading questions from the previous lesson's homework. - Hangs a very small chart showing the human digestive system. - Starts asking questions related to the sketch. "Mention" and "what" questions. - She is encouraging learners to ask questions - Refers questions to other learners. - Then amplifies answers. - Gives learners homework: to collect different food items and food containers. - She demands that everyone should do it. 	<ul style="list-style-type: none"> - Giving answers to questions on the previous homework. - Labeling the digestive system. - Complaining about the size of the poster - A learner asks a question on the function of the gallbladder. - A fellow learner tells the class that the function of the gallbladder is to release urine (the class laughs). - Complaining that they will not have time for the homework because they will be involved in sport this afternoon. 	<ul style="list-style-type: none"> - Not explaining why glycogen and starch is stored in the liver. - A bigger poster would have made facilitation and participation easier. - The teacher does most of the explaining. - She is worried that the class is not involved today, "are we together class?" - From the beginning I could see that the learners were happily participating but they seem to get lost when she starts explaining about what happens to food in each part of the digestive system. - The fact that the learners laugh at a colleague's answer suggests that they have their own opinions and the teacher should have followed this a bit instead of promptly giving the

			right answer. One should try and understand the learners and the community they come from.
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By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
12:20 to 13:20	<ul style="list-style-type: none"> - Led the review of the previous homework. - Introduced the lesson's topic and then asked the learners to identify the parts of the human digestive system. - Presented the different stages in the process of digestion through question and answer method. - Invited questions from the class and led the session to find answers to the questions. - Gave out the day's reading assignment to reinforce class work. 	<ul style="list-style-type: none"> - Gave answers to the questions - Labeled the human digestive system - Answered the teacher's questions. - Asked questions. 	<ul style="list-style-type: none"> - Lesson started with a review of homework written in the previous lesson. - The drawing of the Human Digestive system put on the board was very small, making it difficult to see and identify all the parts from back of the classroom. - All the stages and stations in digestion were put on the chalkboard making it easier to summarize. Only one learner actually asked a question.

By lesson observer 2.

SCHOOL: B.

TEACHER: 4.

LESSON: 3.

Date: 14/6/2001.

No. Of learners in class: 31.

Grade: 10. A.

Lesson duration: 40 minutes.

Lesson Topic: Is it food components? (Not mentioned).

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
11:20 to 12:00	<ul style="list-style-type: none"> - Telling learners to show food items that they were supposed to collect as homework. - Started asking questions on the previous lesson. - Tells learners to follow an activity on page 68 of their textbook. - Moving around and talking to groups. - Asks for feedback after giving them enough time to complete the task. - Explaining that we do not get anything from alcohol (holding up an empty bottle of brandy for emphasis). - Giving a summary of the feedback on the chalkboard. 	<ul style="list-style-type: none"> - They put food items on their desks. - Answering questions - Work in groups to do the activity. - Start giving feedback. 	<ul style="list-style-type: none"> - The teacher asks what questions only on the previous lesson. - The class did not interrogate the food elements to my satisfaction. They were just scratching the surface. - The learners did not write down what I think was a good summary on the chalkboard and the teacher did not encourage them to do so. - The lesson was over with ten minutes to spare and they started writing a Silozi assignment.

By the Researcher.

Time	TEACHER'S ROLE	LEARNERS' ROLE	COMMENTS
11:20 to 12:00	<ul style="list-style-type: none"> - Asked learners to display what they had brought as part of the previous day's homework. - Presented a short summary of the previous day's 	<ul style="list-style-type: none"> - Displayed the food packaging they had collected (or containers e.g. packets, cans, tins, etc.). 	<ul style="list-style-type: none"> - The topic of the lesson was not given. - Learners had brought different food packages/ containers (e.g. packets, cans, tins, etc.). - At the end of the lesson the

	<p>lesson.</p> <ul style="list-style-type: none"> - Organized the class into groups of about four learners per group. - Guides/ monitors the group discussions - Facilitated the feedback session by asking each group to give the nutritional values of the food substances usually stored in the packages the learners brought. - Wrote down the main points from the group feedback. 	<ul style="list-style-type: none"> - Answered questions on the previous day's lesson - In groups they discussed the food substances indicated on the food packaging the group members brought with them. - One learner from each group gave feedback. 	<p>teacher gave learners time to write notes on the lesson. Many ignored the teacher's notes on the chalkboard and started writing Silozi homework.</p>
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By lesson observer 2.

6. What is your understanding of reflective teaching?
7. What would you like to see in place for teachers to teach in a learner-centred way?

INTERVIEW SCHEDULE FOR A GROUP OF LEARNERS.

School:

No. Of learners:

Date:

1. Why are you studying Biology?
2. What kind of a lesson do you enjoy most, and why?
3. What do you think is the role of learners in a lesson?
4. What is the role a teacher in a lesson?
5. What do you do when you do not perform well in a task e.g. test?
6. In your opinion how important is assessment?
7. What changes would you like to see to improve your learning in Biology?

APPENDIX 3:

WORKSHOP SCHEDULE

FOCUS GROUP OF TEACHERS.

Critical analysis of four (4) observed lessons .

I will make copies of four lessons that I will observe (from different teachers) including my typed comments on each of these lessons and the teachers who will be involved in the **interview** and in the **lesson observation** process will evaluate and discuss the extent to which their lessons were achieving the goals of learner-centred education.

1. Teachers will work in pairs and use the following guidelines in their lesson analysis:
 - The objective of the lesson is it clear and achievable.
 - The activity in the lesson, how was it organised and managed.
 - The role of the teacher. Could it be played differently?
 - The role of the learners. What learner interaction was needed and why?
 - The type of questions asked; who was asking the questions; who is responding to the questions and how questions were responded to.
 - The type of learning developed, e.g. facts, skills, values, and concept formation.
 - How suitable was the method to a class of this size?
 - How useful is the learning to the learners' lives?
 - The teacher's understanding of how knowledge is acquired, is it evident?
 - Does the teacher show understanding of the topic/lesson is it evident?
If yes in what way? If no on what basis are you making the claim?

2. Each pair will report back. Then they will compare their findings and discuss their teaching styles in relation to those revealed in the 4 lesson transcriptions. The plenary session will be tape-recorded.

My colleague (another advisory teacher) will observe and comment (in writing) on the perceptions of the teachers on what LCE is as well as their understanding of how knowledge is acquired.

Adapted from B.Ed (Hons) 2000/2001 FOUNDATIONAL COURSE. By Wilmot, Education Department, Rhodes University. Æñå, ÏÈÇÄÅÖ ! (end of document)