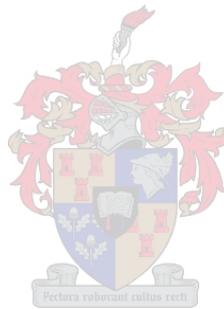


**PERCEPTIONS OF CURRICULUM INNOVATION AMONG
EDUCATORS IN SOUTH AFRICAN DENTAL SCHOOLS – AN
EXPLORATIVE STUDY**

BY

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DECLARATION

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the owner of the copyright thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

December 2009

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ABSTRACT

Curriculum changes that have occurred in most South African dental schools have been influenced by several factors such as organizational outlook (the dental school as a learning organization), legislative frameworks that have had an influence on higher education in South Africa and epistemological interpretations of these changes by educators within dental schools.

Very little is known about how medical and dental educators experience curricular change or innovations that in effect may contest their established pedagogical views. They themselves (especially those who have been teaching for many years) are products of a teacher-centred approach to learning. This, therefore, means they may have a product orientation rather than a process orientation to curriculum development.

What may have been overlooked is that challenges and successes of curricular reform or revision may also be influenced by challenges to the established identity and role of teachers involved, and that some teachers' perceptions about teaching may be in conflict with the recommended changes or innovations.

The purpose of this study therefore, was to explore the influence (if any) on South African dental educators' perceptions towards curriculum change or innovation which has occurred in the dental schools and to assess their orientation to modern pedagogic practice.

The objectives of the study were twofold. Firstly to determine the South African dental educators' perceptions and pedagogic practices to the following trends in health sciences education viz. curriculum organization, education for capability, community orientation, self-directed learning, problem-based learning, evidence-based health sciences education, communication and information technology and service learning. The second objective was to determine the influence of socio-demographic variables to the dental educators' perceptions and pedagogic practices.

Data was collected through a questionnaire which was sent to all educators at dental schools. At the time of conducting this study there were 220 educators; 168 educators responded to the questionnaire. There was a 76% response rate to the questionnaire. The data was processed utilizing responses and coding them into a computerized data

set. It was coded, edited and checked using the procedures provided by the Statistical Analysis System (SAS) in order to work out the various calculations relevant to the study. The SAS FREQ procedure was used to calculate the descriptive statistics needed.

The study indicated that the teacher-centred paradigm is still predominant, even though the educators claimed to be using some aspects of modern pedagogic practice. One socio-demographic variable that had a significant influence ($p < 0,05$) on community orientation was the age of the educator. Another variable that had a significant influence on evidence-based health sciences education was number of years in academic dentistry.

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INTRODUCTION TO THE STUDY

1.1 Introduction

It is well known in curriculum studies that curriculum change or innovation occurs most readily in response to major social changes i.e. to changes in the milieu or context in which a curriculum occurs. There has been a major social change within the South African context since 1994 (post-Apartheid era) which was bound to have an influence on curriculum development in higher education. It remains essential to think about a curriculum as an experience rather than a product or a plan, as a process or a play rather than a script (Luckett, 2001). It is the lecturers and students who remain key agents of the curriculum as they (re) interpret and reconstruct the curriculum plan in terms of their own interactions, inter-subjectivities, lifeworlds and perceptions, which are in turn shaped by the cultures, power relations and contexts within which they live and work. This perspective is captured by Cornbleth's definition of curriculum as "contextualized social practice" which she explains as "an on-going social process comprised of the interaction of students, teachers, knowledge and milieu" (Cornbleth 1990:6).

In an attempt to provide an overview of the background and rationale for this study, I would like to subdivide this section into the following subheadings:

- an organizational perspective;
- a legislative perspective; and
- an epistemological perspective.

1.1.1 Organizational perspective

In order for Faculties of Health Sciences to identify new opportunities and face challenges, it is important for them to be seen and experienced as learning organizations. A learning organization attempts to develop environments, shared visions, mental models, rewards and systems that promote collective learning and innovation by all members of the organization. Members working in a

learning organization must have a sense of ownership and responsibility for the organizational values (Argyris, 1994; Senge, Kleiner, Roberts, Ross and Smith, 1994; Senge, Kleiner, Roberts, Roth and Ross, 1999). Faculties of Health Sciences can be considered as organizations that include students, academic and support staff who work in a system to achieve defined missions. The stakeholders in Faculties of Health Sciences are influenced by internal and external environments such as the vision and mission of the institution which cascades to the various Faculties, as well as higher education policies.

The main mission of schools of dentistry (which are components of Faculties of Health Sciences) is to prepare competent practitioners. This focus, unfortunately, of dental education has created an organizational environment in which the emphasis is mainly on learning using well-tested and tried methods. Innovation and change are less likely to be embraced in such an educational environment because the emphasis is primarily on developing contemporary practical skills within a finite, and relatively short, period of time. However, dental practice like all other aspects of health care is facing technological and biological revolutions. Change is inevitable, and dental schools as well as their graduates should be able to face and deal with challenges using innovation, new ideas, and new operational systems. In view of these changes, there seems to be an urgent need to study and analyze how to develop educational and management systems in dental schools that encourage innovation. Achieving this goal may depend on developing organizations with dynamic and innovative visions as well as academic staff who are willing to learn, change, and take risks (Argyris, 1994; Senge et al., 1994; Senge et al., 1999; Leithwood, Leonard and Sharratt, 1998). This perspective is emphasized by Ross, Smith, Roberts and Kleiner, (1994:150) who says that "...at its essence every organization is a product of how its members think and interact", to which adds: "...thus the primary leverage for any organizational learning effort lies not in policies, budgets or organizational charts, but in ourselves".

Unfortunately there is a paucity of studies that evaluate schools of dentistry from an organizational point of view. A review of curricular change in medical schools also reached that conclusion (Bland, Starnaman and Wersal, 2000:578). In that review, the authors reported that they "were surprised by the relatively small number of sources available that addressed the characteristics of successful

curricular change in higher education in general, and in the professional education of physicians” (Bland, Starnaman and Wersal, 2000). The paucity of evidence was also noted in a pivotal review of the reasons for resistance to change in medical schools (Bloom, 1988). In that review, the conflict between the espoused theory that medical schools have a humanistic vision and the theory-in-practice where research and only research is valued was hypothesized as a major reason why medical educators have been resistant to change (Bloom, 1988).

In industry, there appears to be a wealth of scientific research on the determinants of change and innovation in organizations (Ramer, 1968; Luckenbill-Brett, 1989; Williams and Williams, 1994; Shane, Venkataraman and MacMillan, 1995; Delaney, Jarley and Fiorito, 1996; Edmonston, 1996; Burpitt and Bigones, 1997; Tesluk, Farr and Klein, 1997; Simonin, 1997; Zhou, 1995). However, this body of knowledge has not yet been applied to schools of dentistry or universities. Academic institutions have the same basic components as nonacademic organizations viz. a management structure (deans, chairs and division heads); core staff (academic and support staff) and ‘customers’ (students, patients and policymakers). Schools of dentistry also face the same positive and negative influences on the organizational environments, as do nonacademic organizations. There are also studies that indicate that universities are inherently different from e.g. business organizations (there are a number of these articles in **Change** – one of the leading journals in higher education in the United States of America) and that they should be managed and governed differently.

After assessing the wreckage of a failed attempt to revise the curriculum, a medical school dean captured the challenge of reform as follows: “...it is not enough to have good ideas, other factors are much more powerful” (Hendricson, Payer and Rogers, 1993:184). Berquist (1992), Goffee and Jones (1996) and Schein (1996) studied university culture and teaching staff values as the basis for analyzing adaptability to change. They observed that university teaching staff value independence and autonomy, do not value collaboration, but have a strong need for job security and insulation from risk. Goffee and Jones (1996) envision the organizational culture of an institution as a matrix of two axes, a vertical one representing solidarity (cohesiveness of purpose among organization

components) and a horizontal one representing sociability (interpersonal relationships among persons in the organization). The levels of solidarity and sociability can be high (strong solidarity and much sociability) or low (weak solidarity and minimal effort at sociability). Goffee and Jones (1996:140) conclude that "...university teaching staff, identifying more strongly with their disciplines than with the university itself, typically lack solidarity". Their interpersonal relationships (sociability) may be distant as well, placing the university low on both solidarity and sociability thus making the university culture particularly resistant to change (Goffee and Jones, 1996).

Literature has described dentists as cautious, conservative, valuing order and conformity, with a desire to control events (Grandy, Westermann, O'Canto and Erskine, 1996). Not surprisingly, the independent yet cautious nature of the teaching staff is reflected in the organizational structure of dental schools, most of which operate under a decentralized states-rights philosophy that encourages autonomous action by departments - an organizational structure similar to that of medical schools. Ebert and Ginzberg (1988) describe medical schools as a confederation of semi-autonomous chiefdoms that seemingly exist to compete with each other for treasure (institutional resources), territory (office, laboratory, and clinic space) and political influence (curriculum time). It therefore is certainly no surprise that practicing dentists, relying on scientific research for clinical validation and with increasing work responsibilities, may not be familiar with advances in educational research and modern educational theory. It is notable that many full-time academic dentists are also unaware of the benefits of educational research and its findings (and may even avoid such research), as if dental schools are not dynamic and evolving educational institutions (Peterson, 1998; Lazerson, Wagener and Shumanis, 2000).

Reliance on expert clinicians to teach is understandable and necessary for most health care education. However, such reliance, without institutional or administrative emphasis on a dynamic and coherent educational philosophy, can lead to factionalism, which can diminish the overall student educational experience. A dental school curriculum, for example, could lose some of its educational potential if members of staff were divided in their commitments to current teaching and learning strategies that recognize new pedagogical approaches (Masella and Thompson, 2004).

Facilitating a change in learning culture from the traditional dental school focus on "managing information and technological skills transfer" to one of active, independent learning by engaged students challenged to critically integrate biomedical sciences to clinical dentistry is an onerous task, let alone an agreed upon direction for the profession (Masella and Thompson, 2004:1269). However, this shift to active learning, long recognised as a key component of adult and higher education, is inevitable (Abrahamson, 1996; Frye, Carlo, Litwins and Karnath, 2002; Barzansky and Etzel, 2001; Bernier, Adler, Kanter and Myer, 2000; McLeod, Steiner, Naismith, Conochie, 1997; Bligh, 1995; Bloom, 1995).

Content-enriched and technologically sophisticated health professions often draw upon seasoned and willing practitioners to teach in educational settings, but the bridge between effective practice and effective teaching can be wide (Bland, Starnaman and Wersal, 2000). Members of staff apparently rely, pedagogically, on the number of years of practice experience and teach (lecture) as they once learned themselves. These "traditional" practitioners see themselves as providing "expert" experience delivered in a typical teacher-centred, passive learning environment, offering the prospect of maximum classroom control. These members of staff may be less inclined, and more resistant, to change their approach to one of active student learning (Masella and Thompson, 2004). Despite these organizational perspectives there are external factors such as legislative policies that may also have an influence on higher education institutions including their faculties of health sciences and associated dental schools.

1.1.2 Legislative perspective

The South African Qualifications Authority (SAQA) regulations stipulate that higher education qualifications must be specified in terms of outcomes, both specific and "critical cross field". The regulations stipulate that qualifications must "represent a planned combination of learning outcomes which has a defined purpose or purposes, and which is intended to provide qualifying learners with applied competence and a basis for further learning" (SAUVCA, 1999:19).

SAUVCA¹⁾ informed higher education providers that operating within the new “NQF²⁾-aligned context” would require a new model of Higher Education practice:

- when designing curricula, providers will be required to work in programme teams rather than as single individuals;
- they will also be required to view the curriculum from the learner’s (and society’s) perspective rather than from their own, or from that of their disciplines or even faculties;
- providers will need to “design down” from the end point of the curriculum (SAUVCA, 1999:26).

It is important to realize that there are many external influences which shape the role university academics in South Africa should fulfill. These are:

- the National Qualifications Framework (NQF), which emphasizes competencies and closer links between education training and the recognition of prior learning;
- the Higher Education Act’s (1997) demand that new, flexible and appropriate curricula be developed which integrate knowledge with skills and that standards be defined in terms of learning outcomes and appropriate assessment procedures;
- the Ministry of Education and the South African Qualifications Authority’s (SAQA) priority to link one level of learning to another and enable successful learners to progress to higher levels without restriction from any starting point within the higher education system; and
- a new accreditation system for higher education to be prompted and developed by various role players in collaboration with prospective Education and Training Quality Assurers (ETQAs) (Lategan, 1998:62).
- As a result an increased demand on universities to transformation to external variables should have the effect whereby academics develop better skills to deal effectively with modern pedagogic practice. Higher education policy frameworks alone are not sufficient to guide transformation in universities.

1) South African Universities Vice Chancellor Association

2) National Qualifications Framework

There is also a need to pursue innovative practices driven from “inside” (Gutman 1998:34) that would make academics accountable towards seeing to it that higher education systems transform.

One alternative method [proposed by Elmore (1980) as quoted in De Clercq 1997:130] is called the “backward mapping approach”. Instead of focusing at the top, policy targets are set at the lowest level of the implementation process, as close to the source of the problem as possible. One then works backwards from the site of immediate implementation to determine what higher level structures need to do to support the policy change. Trowler (1998) also recommends beginning at the bottom of the system. He emphasizes the importance with academics’ “situational logic” i.e. understanding the change problem from “underlife” or local perspectives. He stresses that unless the policy change links in with the implementers’ personal visions, identities, cultures and pre-existing values (which are multiple), they will not own the changes and get involved in the experimentation, adaptation and innovation required to implement the policy. Thus, the literature suggests that a successful change strategy must involve dialogue and negotiation between the top and bottom of the system and that it has to engage with and take into account the “lifeworlds” or perceptions of the actors involved.

If the SAQA reforms are taken into consideration, it would appear that there has been an overemphasis on structural reform and insufficient attention paid to the implementation process and the “situational logics” of those who are required to implement the changes. Thus a key principle for any curriculum reform in higher education must be the recognition of the agency and educational professionalism of lecturers and students, and giving them the space to interpret, design and adapt the new curriculum to their circumstances (Lockett, 2001).

In addition, as far as curriculum content is concerned, SAQA have only stipulated the following (SAQA, 2000):

- that all qualifications be made up of three types of learning – fundamental learning (which ensures that the learner achieves the competence required to attain the qualification as a whole as well as providing the foundation for further learning), core learning (which gives breadth and depth to the curriculum, i.e. the content, related to a particular profession, career or field

of specialization) and elective learning (which enriches the curriculum, by meeting the learners' own interests or by providing advanced specialization to the qualification).

- that the critical cross-field outcomes are infused into all qualifications at all levels on the NQF, and that these are demonstrated by learners in integrated assessment tasks
- that this integrated assessment provide opportunities for learners to demonstrate applied competence which means that foundational competence (knowing that), practical competence (knowing how) and reflexive competence (knowing how you know that and how) are all necessary for the accomplishment of the task in a real world context.

The Higher education qualifications framework (HEQF)

- The higher education qualifications framework (HEQF) provides the basis for integrating all higher education qualifications into the NQF and its structures for standards generation and quality assurance. It assists in improving the coherence of the higher education system and facilitates the articulation of qualifications, thereby enhancing the flexibility of the system and enabling students to move more efficiently over time from one programme to another as they pursue their academic or professional careers.
- The HEQF establishes common parameters and criteria for qualifications design and facilitates the comparability of qualifications across the system. Within such common parameters, programme diversity and innovation are encouraged.
- The policy operates within the context of a single but diverse and differentiated higher education system. It applies to all higher education programmes and qualifications offered in South Africa by public and private institutions.

- This policy recognizes the responsibility of the South African Qualifications Authority (SAQA) for registering standards and qualifications in terms of the SAQA Act, 1995 (Act no 58 of 1995) and the Higher Education Quality Committee (HEQC) of the Council of Higher Education's responsibility for quality assurance in higher education in terms of the Higher Education Act, 1997.
- The Council on Higher Education (CHE) has also as its responsibility, the generation and setting of standards for all higher education qualifications and for ensuring that such qualifications meet SAQA's criteria for registration on the NQF in terms of section 1(f)(ii) of the Higher Education Act.
- Standards registered for higher education qualifications must have legitimacy, credibility and a common, well-understood meaning, and they must provide benchmarks to guide the development, implementation and quality assurance of programmes leading to qualifications. The CHE will put in place appropriate safeguards to ensure the integrity of standards generation and quality assurance processes respectively.
- The HEQF incorporates a "nested approach" to qualifications design. Within a nested approach to standards setting, qualification specification requires a movement from generic to specific outcomes. The most generic standards are found in the level descriptors. The most specific standards are found in the programmes that lead to qualifications. Specific standards always meet the requirements of the generic standards within which they are nested or framed. Within this broader context, the focus of the HEQF is on qualification type descriptors – the second layer of a nested approach.

The legislative perspective provides a framework for transformation in higher education, which can have a direct or indirect influence on curriculum development or innovation.

The next aspect to consider as a basis for justification of this study is the epistemological perspective.

1.1.3 Epistemological perspective

Epistemology refers to a branch of philosophy concerned with the theory of knowledge. The central questions it addresses are the nature and derivation of knowledge, its scope, and the reliability of its claims. The related term ontology concerns what can be known, i.e. the kinds of things that exist (Fulop, Allen Clarke and Black, 2001).

The conceptual model proposed by Lockett (2001:55) can be used as a possible “thinking tool” to inform the multiple, differentiated and diverse curricula that the South African higher education system requires. The emphasis and combinations of each of the four ways of knowing (as indicated in Figure 1) would be different depending on the institutional mandate and mission as well as the nature of the programme, students, profession and context. Designers of curricula within dental schools should consider how each of these four ways of knowing are addressed and contextualized.

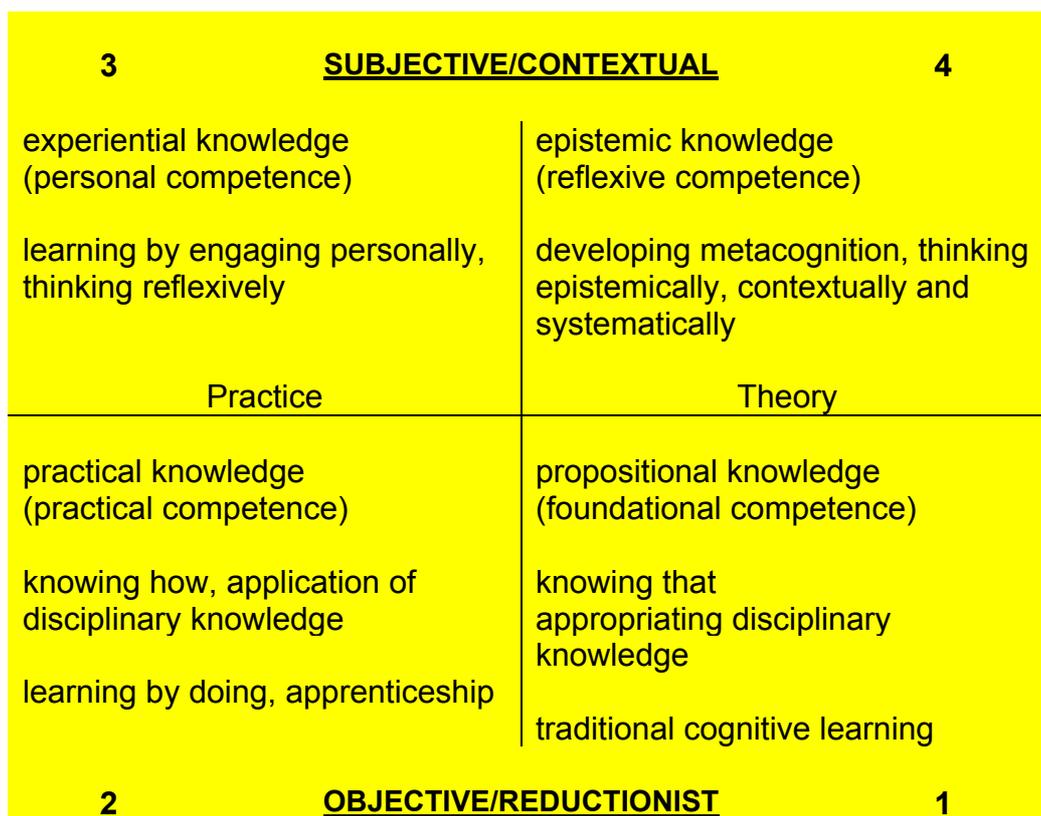


FIGURE 1: DIAGRAM TO ILLUSTRATE A MODEL OF AN EPISTEMICALLY DIVERSE CURRICULUM

Source: Luckett, 2001:55

The first quadrant of the diagram i.e. the learning of propositional knowledge, is that in which universities are traditionally good at dealing with. It is based on the type of knowledge which Gibbons (1994) has labelled as Mode 1. Knowledge production in this quadrant is often based on a positivist, empiricist epistemology and a reductionist methodology; knowledge is viewed as objective, true and rational. This is not suggesting that the learning of propositional knowledge is not important, on the contrary, it should remain a pillar of the higher education curriculum; but the model suggests that this way of knowing needs to be challenged and complemented by other ways of knowing. In most cases the higher education curriculum begins with the learning of propositional knowledge – students will need to gain knowledge and theory from lectures and libraries and be assisted to build disciplinary conceptual frameworks. It is suggested that students in higher education should not be permitted to operate only within the first knowledge paradigm. If they do, they remain locked into mono-disciplinary

world-views and their learning may fail to engage with real world problems and contexts and their personal lives. Lecturers who operate only within this paradigm tend to perceive teaching as the transmission of information which students lack (Luckett, 2001). Most lecturers within the health sciences seem to be more comfortable with the traditional cognitive learning paradigm.

The higher education curriculum should offer students an opportunity for practical applied competence. Curricula in the health sciences emphasize this way of knowing as a means of molding clinical competency. As the Council for Higher Education (2000) has warned, the challenges of the 21st century will not be solved by reproducing well-tried methods and techniques to puzzles defined by a single discipline. Novices in the health sciences begin their practice here as a way of acquiring clinical competency, but the higher education curriculum of the future should encourage students to solve problems in unfamiliar situations that present themselves in unfamiliar forms. To do this, it is argued students need to leave the safety of the lecture rooms, skills laboratories and clinical training areas and be placed in real-world contexts where they will have to adapt and re-contextualise the learning gained in quadrant 1 (Luckett, 2001).

The movement from quadrants 1 and 2 where the health sciences curriculum has traditionally operated, into ways of knowing represented in quadrants 3 and 4 is important; not only because experiential learning is one of the best ways to get learners to engage with and commit themselves to their studies and future careers, but also because this entails critical epistemic shifts (Luckett, 2001). It is important that students be weaned away from dualistic single loop thinking in which they accept given knowledge by the teachers as authoritative (Argyris and Schön, 1974).

Effective experiential learning often occurs in a pedagogical relationship of mentorship or mediation rather than the more traditional modes of tutelage or apprenticeship found in quadrants 1 and 2. In quadrant 3, the role of the lecturer is one of facilitator and mediator rather than instructor.

In this quadrant students should begin to gain control of and accept responsibility for their own learning. The role of the teacher is more to prepare for and structure the learning experience and then to assist the student to process and reflect on it afterwards.

The focus should be on developing the student's personal understanding. Skilled teachers would be required to assist students in becoming aware of their own learning processes and to undertake self-reflexive thinking. The reality in my view is that very few teachers within the schools of dentistry operate within this quadrant or encourage this way of knowing.

Quadrant 4 is the knowledge paradigm where learners are encouraged to develop what Kitchener (1983) has termed "metacognition" (an awareness of how and why one thinks and learns as one does) and then "epistemic cognition" (the capacity to think epistemically, to recognize and evaluate the assumptions and limits of theories of knowledge and to be able to suggest alternatives). This demands high levels of reflexivity which according to Luckett (2001) is not always demonstrated by academics themselves. It is in this moment of the curriculum that learners could develop the capacity for transferring (as opposed to transferable) generic skills. This requires an ability to stand back from ones own frames of reference and epistemology and also to recognize the validity of other ways of knowing. It is also important to note that in order to develop high levels of reflexive competence, most learners will require safe spaces where they can take risks and write and talk to each other. This can be achieved via journal writing, discussion groups, e-mail chat rooms, etc. A mentoring/facilitatory relationship with teachers often provides a context conducive to this form of learning. The ability to understand and position knowledge is important in curriculum development and practice.

The interaction of students, teachers, knowledge and milieu are strongly influenced by the following variables:

- a) the organizational perspective of the dental school viz. whether or not the dental school and its associated stakeholders perceive themselves as a learning organization that must constantly adapt to change
- b) the legislative perspective of higher education within a post-apartheid South Africa.

- operating within the new “NQF aligned context” would require a new model of higher education practice viz. teachers will now have to make explicit their learning outcomes and assessment criteria, they will now be expected to work in programme teams rather than as individuals, they will be required to view the curriculum from the student’s perspective rather than from their own disciplines, from teacher to student-centred.
- universities need to change and align their operations within the new legislative framework. This in effect implies that academics need to develop better skills to deal effectively with modern pedagogic practice.
- the epistemological perspective of the health sciences curriculum is well grounded within the foundational and practical competencies. The emphasis is on traditional cognitive learning (which is predominantly teacher-centred) and learning by doing or apprenticeship in the clinical/practical areas. There is not sufficient emphasis on personal and reflexive competence of the students. The ability to make meaning of what one is learning.

This perspective would therefore require different skills or facilitatory roles from teachers, most of whom are products of a curriculum that emphasized foundational and practical competence and are therefore likely to have difficulty in adapting to current pedagogic practice.

The organizational, legislative and epistemological perspectives provide a background and rationale for this study.

What then are the perceived problems within South African dental schools given the above mentioned context?

1.2 Statement of the problem

Universities in Africa including South Africa are coming under increasing pressure to improve their quality and accountability, both in research and in teaching (Divila and Waghid, 2008; Altbach and Teferra, 2003; Jansen, 2004). However, while there has always been a formal training programme in research, teaching in higher education has generally been carried out by an “untrained profession” (Carrotte, 1994; Masella, 2005). To accede to the demands of their university, teachers may do things either to improve their teaching or help students to improve their learning. In order to do either they must have an adequate understanding of educational principles which underlie and influence their pedagogic practices. Within the context of a dental school, dental education seems to have been carried out under the assumption that good dentists will automatically make good teachers of dentistry and as a result, most lecturers in South African dental schools have no educational background.

Very little is known about how medical and dental educators experience curricular change or innovations that in effect contest their established pedagogical views. They themselves (especially those who have been teaching for many years) are products of a teacher-centred approach to learning. This, therefore, means they may have a product orientation rather than a process orientation to curriculum development. What may have been also overlooked is that challenges and successes of curricular reform or revision may be influenced by challenges to the established identity and role of teachers involved, and that some teachers’ beliefs and or perceptions about teaching may be in conflict with many of the current institutional, curriculum and epistemological expectations.

1.3 Aim and objectives of the study

The purpose of this study, therefore, is to explore the influence (if any) on South African dental educators’ perceptions towards curriculum change or innovation which has occurred in the dental schools and to assess their orientation to current pedagogic practices.

The objectives of this study are:

- a) To determine the South African dental educators' perceptions and pedagogic practices to the following educational dimensions:
 - curriculum organization and practice
 - education for capability
 - community orientation
 - self-directed learning
 - problem-based learning
 - evidence-based health sciences education
 - communication and information technology
 - service learning.
- b) To determine the influence of socio-demographic variables to dental educators' perceptions and pedagogic practices.

This information might constitute a useful set of baseline data about the pedagogic orientations of South African dental educators which would assist in indicating the types of interventions required for staff development within each dental school.

1.4 Delimitation of the study

This study is limited to examining dental educators' perceptions towards curriculum change and their pedagogic practice in the five dental schools in South Africa. Four of the five dental schools viz. University of Limpopo (MEDUNSA Campus), University of Pretoria, University of the Witwatersrand and University of the Western Cape are fully fledged dental schools (with undergraduate and postgraduate programmes) and the University of KwaZulu Natal is limited to training dental therapists and oral hygienists only (auxiliary dental professionals). The study included both full-time and part-time academic staff and asked for their responses during the period May 2007 to November 2007.

1.5 Outline of the study

Chapter 1: Introduction

The purpose of Chapter 1 is to provide the background and rationale for the study, the research problem and its significance as well as the purpose and objectives of the study.

Chapter 2: Literature Review

In Chapter 2 available research in this field of study is reviewed. This is done by focusing mainly on the relevant educational dimensions in health sciences education viz. education for capability, community orientation, self-directed learning, problem-based learning, evidence-based health sciences education, communication and information technology and service-learning. This chapter constitutes the theoretical base of the study.

Chapter 3: Research Methodology

In Chapter 3 the research methodology used in the study is discussed. The study population and how it was obtained, the methods of data collection as well as the methods and procedures of data analysis are discussed.

Chapter 4: Research Results

In Chapter 4 the results of the study are presented. Basic statistical analysis of trends is provided, followed by conclusions drawn from the results.

Chapter 5: Interpretation of Results and Discussion

In Chapter 5 the results of the study will be interpreted and discussed in alignment to the literature reviewed. Limitations of the study will be made.

Chapter 6: Conclusions and Recommendations

In Chapter 6 there is a brief discussion of the implications of the findings of the study. The chapter concludes with some comments on the limitations of the study.

Note: Traditionally teachers at universities are referred to as lecturers. The term teacher in this study is used interchangeably with lecturer or educator because the relevant literature reviewed seems to justify it.

LITERATURE REVIEW

2.1 Introduction

The changes in higher education nationally and internationally have been influenced by current social, economic and political developments. Factors that have influenced changes in higher education are well documented (Strydom 2000; Woodhouse 2000) and include globalization; massification (leading to larger classes and more diverse student populations); shrinking resources; increased demand for quality and greater public accountability and competition among higher education institutions. These factors have resulted in changes that have transformed the traditional role of academics in higher education. Academics now operate in what Barnett (1994), terms a “world of super-complexity” where the very frameworks on which their profession are based are continuously in a state of flux. Light and Cox (2001:25) even talk of academics experiencing the post modern condition of uncertainty and ambiguity as a “storm”.

South African higher education is in the process of radical transformation, amongst other things as a result of a new democratic political and social dispensation. The Higher Education Act 101 of 1997 (Republic of South Africa 1997) requires higher education institutions to restructure and transform in order to respond, inter alia, to the need for equity and redress, and to contribute to the human resource, economic and development needs of the country. In addition, there is increasing pressure on universities to account to government and society at large for the way they respond to the transformation imperatives as well as for the quality of the teaching and learning in institutions. This has implications for the curriculum structure of the various faculties and schools as well as the attitudes, perceptions and beliefs of lecturers.

Traditionally lecturers in dental schools have undergone little or no formal preparation for their role as teachers (Carrotte, 1994). They themselves are products of the traditional paradigm - yet curricula stand at the heart of the

teaching and learning transaction in higher education. As Ensor (2002:272) puts it, the issues of knowledge production through research and knowledge reproduction through curriculum and pedagogy have enjoyed far less prominence and attention from the policy makers and education planners alike.

Significant curricular changes continue to take place in efforts to improve the education of medical and dental students (Harden, 2000), yet many schools experience a lot of staff resistance to change (Abrahamson, 1992; Des Marchais, Bureau and Dumais, 1992 and Masella, 2005). Although organizational and institutional challenges to a student-centred curriculum have been reported (Boud and Feleti, 1992; Vernon and Blake, 1993; Bernstein, Tipping, Bercovitz and Skinner, 1995), the issues affecting staff reactions to the implemented change have rarely been examined (Sparks, 1988; Creedy and Hand, 1994). The critical question then is why do faculty members resist change if it is meant to improve educational efforts?

Very little is known particularly in South Africa about how medical and dental educators experience curricular changes that contest their established pedagogical views (McAuley and Woodward, 1984; Vernon, 1995). The primary focus in the literature is apparently on comparisons between problem-based learning and the traditional curriculum (Berkson, 1993; Antepohl and Herzig, 1999; Finch, 1999), curricular design guidelines (Barrows, 1985), the tutorial process (Barrows, 1988), tutors' content expertise (Silver and Wilkerson, 1991; Eagle, Harasym and Mandin, 1992), organizational implementation efforts (Albanese and Mitchell, 1993) and learning outcomes (Coles, 1990). What may have been overlooked is that challenges and successes of curricular reform or revision may also be influenced by challenges to the established identity and role of the teachers involved (Wilkerson and Maxwell, 1988) and that some teachers' beliefs about teaching may be in conflict with the recommended changes (Olson, 1980; Prawat, 1992). In addition, it is important to note that broad ownership and involvement of all stakeholders (staff and students) in the process of curriculum development has been identified as an essential predictor of successful curriculum change (Ross and Fineberg, 1998). The pedagogic shift from the traditional approach to an outcomes-based competency driven approach requires a fundamental change of the roles and commitments of educators, planners and policymakers (Hendricson and Kleiffner, 1998). Teachers of health professional

education in South Africa are supposed to be well-informed about innovative trends in higher education and utilize these to increase relevance and quality of education in order to produce competent human resources for the region. These emerging innovative trends in health sciences education (Bligh, 1998; Jason, 2000) and the associated relevant literature will be explored next.

2.2 Education for capability

In most health sciences faculties, existing training provided a general education in a variety of subjects relevant to medical or dental students' need and this broad base has made a significant contribution to the problem of information overload (Newble, Stark, Bax and Lawson, 2005). Education for capability is a move to strike a balance between general education and vocational training to bring relevance in education in order to reduce information overload in the curriculum (Harden and Davis, 1995; WHO, 1987).

To overcome the problem of factual or information overload, a new strategy, "core with options", has been advocated (Harden, Sowden, Dunn, 1984; Bligh, 1995). Core curriculum is to be developed by delineating basic knowledge, skills and attitudes, which must be studied "before a newly qualified health sciences professional can assume the responsibilities of a registered professional" (GMC, 1993). "Options" provides areas to the students for study depending on individual needs or interests. Mastery of the core ensures the maintenance of standards; the options provide in-depth work and achievement of high level competencies, such as for example critical thinking or any other relevant field that is of interest to the student.

Another facet of education for capability is the increased importance placed on practical training and generic competencies. Concern has been expressed that the undergraduate curriculum fails to fulfill this expectation, despite the students' exposure to clinical teaching (Jolly and MacDonald, 1989; Lowry, 1992; McManus, Richards and Winder, 1998). In addition to clinical competencies, students must develop generic competencies or transferable personal skills essential to their roles as health professionals, which include bio-ethics and communication skills, interpersonal skills, problem-solving ability, decision-making capability, management and organization skills, working in a team, IT skills and doctor-patient relationships (Dalgarno, 2001).

In the last quarter of the 20th century the need to reshape basic medical and dental curricula was neither new nor restricted to any one country. What was different was the will of the professional statutory bodies such as the General Medical Council in the United Kingdom and the Health Professions Council in South Africa to rethink what would be expected of the newly qualified doctor or dentist and to require their constituent medical or dental schools to respond positively to their recommendations (GMC, 1993). These recommendations were influenced by the exponential increase in biomedical knowledge, the emergence of new disciplines and subject areas, and a persisting and unrealistic drive for completeness in the curriculum (Bertolami, 2001). It was therefore inevitable that basic medical curricula would become intolerably overloaded. In turn, information overload has been identified as the root cause of many of the curricula ills detrimental to student learning including among others:

- undue emphasis on the acquisition (and examination) of factual knowledge at the expense of other key professional competencies;
- stifling of curiosity, enquiry, reasoning and the exploration of knowledge;
- poor preparation of graduates for modern practice and the next phase of the medical and dental educational continuum viz. lifelong learning (Pyle, Andrieu, Chadwick, Chumas, Cole, George, Glickman, Glover, Goldberg, Haden, Hendricson, Meyerowitz, Newmann, Tedesco, Valachovic, Weaver, Winster, Young and Kalkwarf, 2006).

In the field of education the concept of a “core curriculum” is not new (Cholerton and Jordan, 2005). However, in the first edition of the General Medical Council’s *Tomorrow’s Doctor* (GMC 1997), its linkage with student-selected components as a strategy to circumscribe the requirements of basic medical education and in so doing to reduce the curriculum overload, was considered a powerful and innovative idea. The broad purpose of the student selected components was to supply an experience for students which “ ... provides them with insights into scientific method and the discipline of research that engenders an approach to medicine that is constantly questioning and self-critical” (GMC 1997:10).

Despite the above mentioned issues and principles, the importance of providing quality undergraduate medical and dental education has been recognized,

particularly in today's climate of increased accountability (Whipp, Ferguson, Wells and Iacopino, 2000). As a result, interest in medical and dental education has focused on the lecturers/trainers themselves and the quality of the educational experience they offer students and trainees. (Hesketh, Bagnall, Buckley, Friedman, Goodall, Harden, Laidlaw, Leighton-Beck, McKinlay, Newton and Oughton, 2001). This was because it was realised that a key problem facing health sciences education is that in most cases those engaged in health sciences education and training activities have little or no formal training as educators (Carrotte, 1994). This is further verified by the Dearing (1997) and Garrick (1997) reports in the United Kingdom which recommended that all new lecturers in higher education in the United Kingdom should at least complete an accredited course in teaching or to have an equivalent experience.

Furthermore, education for capability is also dependent on the educational skills of the teacher or lecturer particularly in a clinical setting to highlight or crystallize competency (Rees, 2004). Some relevant papers reviewed included that of Stritter, Bland and Youngblood (1991) who identified core non-clinical competencies essential for clinicians, many of which relate to teaching or lecturing. Irby (1996) identified components of knowledge essential to clinical teachers for excellence in teaching. Litzelman, Stratos, Marriot and Skeff (1998) described the use of an educational framework within which Stanford Faculty Development programme defined the components of effective clinical teaching. Pinsky, Monson and Irby (1998) looked at "distinguished teachers" from clinical departments to identify the principles of teaching excellence. Their study focused on doctors who had been identified as excellent teachers by student trainee ratings and/or doctors who were participants in "Teaching Scholars Programs". In the United Kingdom, Sidford (1998) carried out a Delphi exercise to assess the needs of general practice tutors prior to designing an introductory training package in medical education. Stephens and Woodcock (1999) identified the concerns about teaching of those attending a New Teacher Workshop, also for general practice tutors. Whitehouse (1997) described the content of a course set up to develop the adult education skills of consultants and Wall and McAleer (2000) have attempted to define a core curriculum for training consultant teachers.

Literature relating to education in general, as opposed to focusing on medical education, was also briefly explored. Beaty (1998) described common features of programmes for teachers in higher education based on current understanding of good practice. Gosling (1997) identified a range of competencies of a good teacher to help departments in higher education institutions improve the way they recruit good teachers.

Effective clinical training is mainly dependent on having excellent clinical educators or tutors (Harden, Davis and Crosby, 1997). However, Barr and Tagg (1995) have argued that students have to be regarded not just as making meaning out of what their teachers say or do or as receivers of transmitted knowledge but more as “the co-producers of learning”. This perspective is part of what Barr and Tagg (1995) in their seminal paper discern as a shift in higher education from an Instructional Paradigm to a Learning Paradigm. What then are the challenges faced by medical and dental schools?

The three circle model proposed by Harden, Crosby and Davis (1999:10) represents the learning outcome appropriate in the training of a doctor or dentist as a “professional able to undertake the necessary clinical tasks in an appropriate manner”. This model has been adapted and applied to the learning outcomes expected of training programmes designed to produce effective teachers (Hesketh, et al., 2001).

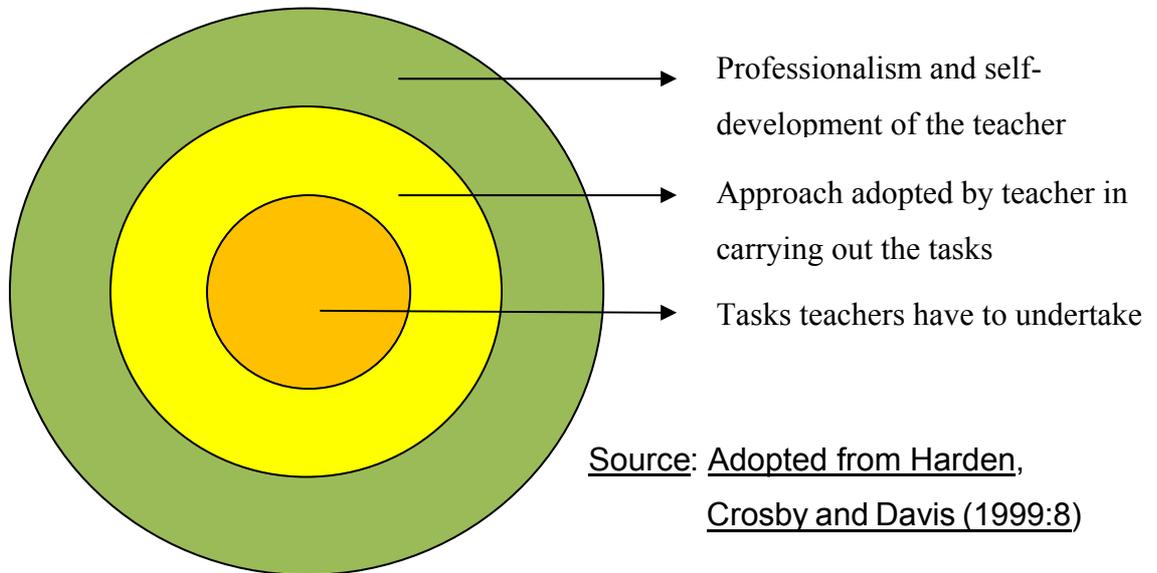


FIGURE 2: THE LEARNING OUTCOMES FOR THE “EFFECTIVE TEACHER” BASED ON THE THREE CIRCLE MODEL

The inner segment of the circle in fig 2 represents the tasks teachers or lecturers might have to undertake as part of their teaching role. The middle segment covers the approach adopted by the teacher or lecturer in carrying out the tasks identified in the inner segment eg. having an understanding of their teaching, empathising and showing an interest in the learners or students, and reflecting on teaching practice through best evidence-based medical education. The outer segment relates to the professionalism and self-development of the individual as a teacher or lecturer, eg. responding to evaluation comments and constructive criticism from others. Both the middle and outer segments reflect the ability of a health sciences professional to think and act as a teacher (Hesketh et al., 2001). As Harden et al. (1999:11) describe, “the competencies implicit in the outcomes in the middle and outer circles transcend and act on or work through the competencies identified in the outcomes of the inner circle”. Such interaction is a feature of the successful performer.

This three circle framework by Harden et al. (1999:8) builds on the work by Squires (1999) who analysed the profession of teaching through three questions:

- What do teachers do?
- How do they do it?
- What affects what they do?

2.2.1 The tasks the doctor as teacher is able to do

According to Hesketh et al. (2001) there are seven task oriented competencies. These competencies can be equated to the “task-orientated or technical intelligences” described in Harden et al. (1999:12), which drew upon Gardner’s theory of multiple intelligences (1983). Competency-based and outcome-based medical education focuses on the result of the education process, not the process itself. The learning outcomes in this category are a visible or explicit requirement for the teacher and are relatively easily assessed:

Outcome 1: Competence in teaching large and small groups;

Outcome 2: Competence in teaching in a clinical setting;

Outcome 3: Competence in facilitating and managing learning;

Outcome 4: Competence in planning learning;

Outcome 5: Competence in developing and working with learning resources;

Outcome 6: Competence in assessing trainees and

Outcome 7: Competence in evaluating courses and undertaking research in education.

2.2.2 How the doctor approaches his/her teaching

The second group of outcomes covers how teachers or lecturers approach their teaching practice. These outcomes encompass the “intellectual, emotional and creative intelligences” (Harden et al., 1999:12).

Outcome 8: With an understanding of the principles of education (intellectual intelligences)

This outcome requires doctors as lecturers to be familiar with, and have sufficient understanding of, the various approaches to education which can inform their teaching (Simpson, Fincher, Hayler, Irby, Richards Rosenveld and Viggiano, 2007). They should also have an understanding of the educational ideas and or concepts used in their organization (Harden and Crosby 2000; Masella, 2005; Licari, 2007). This therefore means they should understand the basic theories of learning and their practical implications, and be aware of different learning styles (Harden and Crosby, 2000). The doctor would be required to understand the

principles underpinning a range of teaching and learning techniques, which include problem-based learning, small group learning, outcome-based education, multi-professional education and timeously giving feedback to students (Harden and Crosby, 2000). Being competent in this outcome according to Hesketh et al. (2001), means the lecturers are not only able to carry out the techniques, but that they also understand what they are doing and can justify why they are doing it (Crawford, Adami, Johnson, Knight, Knoernschild and Obrez, 2007; and Hendricson, Andrieu, Chadwick, Chmar, Cole and George, 2006).

Outcome 9: With appropriate attitudes, ethical understanding and legal awareness (emotional intelligences)

A doctor who is an effective lecturer is also one who takes an appropriate approach and attitude towards teaching and learning of trainees and or students. This includes showing enthusiasm for teaching and learning and the associated innovations in curriculum development, as well as developing a positive relationship with students (Harden and Crosby, 2000).

Outcome 10: With appropriate decision-making skills and best evidence-based education (analytical and creative intelligences)

This outcome is primarily about teaching in an educationally sound and creative way. The “star teacher” uses evidence-based medical education as the basis for their decisions on which teaching and learning strategy to adopt (Belfield, Thomas, Bullock, Eynon and Wall, 2001). This outcome also recognizes the creative element in teaching as a source of motivation and inspiration for students (Harden, Grant, Buckley and Hart, 1999; Masella and Thomspson, 2004; Steinert, Mann and Centeno, 2006).

2.2.3 The doctor as a professional teacher

The two categories of outcomes described above focus on what the teacher does and how he/she does it. The outcomes in this third and final category emphasise the role of teachers within their organization; and their professionalism and personal development as a teacher. The doctor as an effective lecturer, is aware and has an understanding of his/her own role as a teacher in the overall

organization of teaching within the Health Service and University. He/she has also accepted responsibility for his/her own ongoing personal and professional development. As a result it is therefore important that the doctor who has a formal educational role keep up to date with what is happening in the field of education and reads the relevant journals (Masella, 2005). The outcomes in this category are described as the personal intelligences of the lecturer.

Outcome 11: The role of the teacher within the health service and the community

This outcome is not only about being aware of the recommendations and requirements for teaching and training, but also taking them on board – it essentially amounts to being seen to recognize the importance of teaching along with other commitments. It recognizes the doctor as a person who successfully combines being a teacher, a manager of teaching and a researcher in teaching, along with their duties as a clinician (Harden and Crosby, 2000).

Outcome 12: Personal development with regard to teaching

This outcome is about doctors taking responsibility for their own self-development and becoming life-long learners with regard to teaching, i.e. including teaching in their professional development through reflection, peer review, feedback, reading or other teaching-related continuing professional development activities (Licari, 2007; Crawford, et al. 2007).

Implicit in education for capability concept is that medical and dental schools should have good lecturers capable of teaching within the competency-based educational framework (Licari, 2007). It is important to hold teaching to the same high standards as research and patient care if education for capability is to succeed in health sciences institutions (Mennin, 2005).

In today's complex world, it would seem that the aim to educate is not only for competence, (i.e. the acquisition of knowledge, skills, and attitudes) but for capability (the ability to adapt to change, generate new knowledge, and continuously improve performance). Capability is enhanced through feedback on performance, the challenge of unfamiliar contexts and the use of non-linear

methods such as story telling and small group, problem-based learning (Fraser and Greenhalgh, 2001). Education for capability seems to focus more strongly on processes (supporting learners to construct their own learning goals, receive feedback, reflect and consolidate) and avoids goals with rigid and prescriptive content.

The movement towards a competency-based curriculum in dental education aims at producing graduates who are not only able to provide comprehensive patient care that is scientifically based and technologically appropriate but are also able to appreciate, understand and actively seek solutions to current intellectual, social, behavioural and philosophical problems in dentistry (Hendricson and Cohen, 1998). They are dentists who are committed to reflective practice and life-long learning (Chambers, 1993 and 1994). In the move toward a competency-based model, many dental schools including South African dental schools are experimenting with different methods of curriculum organization and sequence (Chambers, 1993 and 1994; Glassman and Meyerowitz, 1999; Gray and De Schepper, 1995; McCann, Babler and Cohen, 1998; Tedesco, 1995). However, simple alteration of instructional sequence may not significantly affect the teaching practices of academic staff within a dental school (Tedesco, 1995). In addition, new ways of organizing the dental curriculum may not change the academic staff beliefs about the kind of knowledge that is essential for dental practice (Whipp, Ferguson, Wells and Iacopino, 2000).

Some dental schools in the world have been experimenting with teaching methods such as problem-based learning, reflective activities, heuristic strategies and performance-based assessment (Glassman and Meyerowitz, 1999; Tedesco, 1996; Shatzer, 1998; Rubeck and Witzke, 1998; Valachovic, 1997; Schmidt, 1998), while other schools remain locked into more traditional methods.

As many leaders in the curriculum revolution in for example, nursing education, have argued that, if the goal of professional education is a technically knowledgeable graduate who is a life-long learner, socially astute, professionally aware and competent, then the kinds of knowledge needed to shape these particular attitudes and skills need to be properly addressed in the curriculum (Bevis and Murray, 1990; French and Cross, 1992; MacClean, 1992 and Tanner, 1990). Dental educators not only need to become aware of forms of knowledge other than technical, but they need to become aware and skilled in the teaching

strategies that foster these other forms of knowledge (Hilton and Slotnick, 2005).

Habermas (1971), a German social theorist and philosopher, offers a way of looking at knowledge beyond the technical in his description of three forms of knowledge: technical, practical and emancipatory. Habermas's argument is based on his critical examination of the claim that science offers a natural objective reality, which can be understood in the same way by natural and social scientists. Instead, Habermas maintains that different forms of knowledge (in both natural and social sciences) are determined by different groups of people whose needs and interests vary and whose research methodologies and ways of knowing differ, depending largely on these needs and interests. For Habermas, technical knowledge is developed by those interested in controlling and manipulating the environment; it tends to look for causal explanations.

Technical knowledge includes the laws, principles and theories derived from the empirical analytical sciences. In dental education, technical knowledge includes most of what has been traditionally taught in both basic and clinical sciences. In this case the curriculum is "designed in advance" (Barnett and Coate, 2005:20), it is developed from a generic template of some sort, by subject experts in the light of their knowledge of the discipline and their assumptions about student needs. The teacher or lecturer implements the curriculum and student learning is controlled, so that at the end of the teaching process students can be judged in terms of how well they achieved the unit or programme goals. Content is a highly significant aspect of the curriculum, is selected by the teacher, and acts to both constrain curriculum change and determine which aspects are modified (Fraser and Bosanquet 2006).

Practical knowledge is developed by those interested in social interaction and communication; it tends to seek interpretations derived from the historical-hermeneutic sciences like history, literature, and the social sciences. Instead of laws and theories, its focus is on collective understandings and applications within a particular context. A curriculum that seeks development of practical knowledge emphasizes communication, collaboration and group problem-solving rather than objective knowledge acquisition (Fraser and Bosanquet, 2006). In dental education, practical knowledge includes many of the critical thinking, problem-solving and communication competencies promoted for comprehensive

patient care (Hilton and Slotnick, 2005; Fraser and Greenhalgh, 2001). Meehl (1967), from a clinical psychologist perspective proposes that these aspects of practice knowledge (cognitive activities of the clinician) can never be replaced by technical knowledge alone but largely by the clinicians experience and skill. In a clinical context, this therefore means that the dentist must relate scientific principles in a particular aspect of the patient's life history and clinical presentation. Such decision-making is often referred to as the art of dentistry (Whipp et al., 2000). Within this perspective the student learning experience is central to the curriculum, and reflective practice is at the heart of teaching. Teachers or lecturers reflect on their teaching, receive student feedback and synthesise what the literature can contribute to the process of improvement (Fraser and Bosanquet, 2006). This perspective is process focused and student-centred, unlike the technical aspect which is teacher-directed and product focused (Fraser and Bosanquet, 2006; Fish and Coles, 2005).

Finally, emancipatory knowledge is developed by those interested in self-knowledge and self-reflection with a particular emphasis on gaining control over constraints on personal and social progress. Drawing from the critical social sciences, a curriculum that seeks the development of emancipatory knowledge emphasizes active investigation and inquiry, self-reflection, ethical decision-making, and individual empowerment often derived through a critique of the social and political forces that shape and hinder personal and professional activities (Bevis and Murray, 1990; French and Cross, 1992; Ewert, 1991). In dental education, emancipatory knowledge includes the skills needed for autonomous and life-long learning that are stressed in current discussions of competency (Chambers, 1993 and 1994; Glassman and Meyerowitz, 1999; Tedesco, 1995 and 1996).

The practical and emancipatory forms of knowledge have been underemphasised in most dental curricula, therefore, until these forms of knowledge are acknowledged and fostered, visions of competency and capability in dentistry and the synergy of theory and practice will be difficult to achieve. The examples of pedagogy that supports these views of knowledge are problem-based learning and case-based methods, heuristic strategies, journals, reflective storytelling and performance-based assessment methods. The challenge therefore is to ensure that the curriculum development processes within dental

schools are sensitive to the above mentioned principles if education for capability is to be achieved.

It seems important to realise that the Habermas framework of technical, practical and emancipatory forms of knowledge, provides a way of assessing the notion of knowledge, and thereby interpreting the epistemologies and assumptions that underpin our roles as teachers or lecturers, which in turn form the basis for our practice as curriculum developers (Fraser and Bosanquet, 2006; Harden and Crosby, 2000).

The above-mentioned issues have implications for curriculum design. Changes in curriculum design have introduced more complex structures with a trend towards progressive learning with integration between subjects and disciplines rather than the more familiar “string of pearls” programmes of the traditional approach (Fraser and Bosanquet, 2006:271). Conventional schools place an emphasis on longitudinal and continuous progression through firstly, a preclinical, and then a clinical syllabus, with subsequent loss of integration between subjects. In innovative programmes, the emphasis is on a greater number of identifiable blocks, each interrelated. There are often opportunities for cyclical learning as for example in a spiral curriculum (Harden, Davis and Crosby, 1999), with both vertical and horizontal integration. More attention is paid to issues related to entry requirements and exit characteristics (Hendricson and Kleiffner, 1998). Within the domain of education for capability or competency, assessment is more frequent, is often formative and the summative element is balanced to test knowledge as well as application (Bligh, 1998).

2.3 Community orientation in health sciences education and service learning

The strategic hallmark of community orientation in health sciences education is community-based training, where students are placed in the community and learn by delivering the care using existing health services. Adoption of community orientation in health professional education has potential benefits for the students, the health sciences academic staff and the community (Prywes, 1983; Murray, Jinks, and Modell, 1995; Oswald, Jones, Date and Hinds, 1995; Bringle and Hatcher, 1996; Habbick and Leeder, 1996; Seifer, 1998; Strauss, Mofidi, Sandler, Williamson, McMurthy, Carl and Neal, 2003; Yoder, 2006).

Calls to make curricular changes in the way health professionals are educated have been voiced for more than a decade (Pew Health Professions Commission, 1993; Gelmon, Holland and Shinnamon, 1998; Field, 1995; Bellack, 1995; Showstack, Fein, Ford, Kaufman, Cross and Madoff, 1992; Seifer, 1998). Higher education must not only seek to develop a clinically competent practitioner but also one who is knowledgeable about community health issues and possess an ethic of service and social responsibility (Yoder, 2006). In today's evolving social, economic and health care environment, a traditional curriculum that confines students to lecture halls and clinics is viewed as increasingly inadequate to train competent graduates to meet the health care needs of the population (Mofidi, Strauss, Pitner and Sandler, 2003).

In response to calls for change, increasing numbers of health professions educational programmes including dental schools have integrated community-based education into their curricula (Seifer, 1998; Eyler and Giles, 1999). Community-based education holds great promise for training students how to function as health professionals in the real world (Seifer, 1998; Bringle and Hatcher, 2000). This type of experiential education offers students first-hand knowledge of people and communities and introduces them to the complexities of professional life and of patient care beyond the lecture rooms and dental school clinics within the faculty of health sciences (Smith and Irby, 2001). Community-based experiences provide a valuable setting for students to place their roles as health professionals into the larger social context and apply what they are learning in dental schools to actual situations (Seifer, 1998). They broaden students' understanding of the multiple determinants of health, develop their patient communication skills, and enhance their capacity for and interest in working with underserved populations (Gelmon and Holland, 1998; Seifer, 1998).

Experiential education is a basic feature of preparing health sciences professionals. For example dental students master clinical skills through the experience of providing services for patients in dental school clinics with direct supervision, in combination with didactic instruction (Yoder, 2006). However, in addition to mastering the art and science of dentistry, the public expects dentists to be prepared to serve diverse patients and communities and to use their knowledge to inform the development of public policy and develop a sense of

civic responsibility (Yoder, 2006; Lautar and Miller, 2007; Seifer, 1998). Consequently, dental educators need to ask the question: Do dental graduates internalise an appropriate vision of their role as a health professional in the context of the community? (Yoder, 2006). Integrating service-learning into the dental curriculum will create a deeper understanding of the dynamics, the assets, and the challenges of the community and its relationship to oral and general health (Lautar and Miller, 2007). These insights can be taught most effectively through experiential learning in partnership with the community. Therefore to foster graduates with skills and ethics that reflect value for civic responsibility, dental education must create the opportunity for students to experience activities that will facilitate acquisition of those skills and values (Seifer, 1998).

It is evident from the literature that the field of experiential education is the pedagogical foundation of service-learning (HEQC/JET, 2006:16). Furthermore, service learning is rooted in the theories of constructivism (Lauthar and Miller, 2007; HEQC/JET, 2006:4). In order to ensure that service within the community promotes substantive learning, service-learning connects students' experience to reflection and analysis in the curriculum (Duley, 1981). This therefore means that service-learning emphasizes reflective practice, reflection facilitating the connection between theory and practice and thereby fostering critical thinking (Seifer, 1998). Service-learning points to the importance of contact with complex, contemporary social problems, and efforts to solve them as an important element of a complete education. It invokes the theories of Bandura (1977), Coleman (1977), Dewey (1963), Freire (1970, 1973), Kolb (1984), Argyris and Schön (1978), Resnick (1987), Schön (1983, 1987) and others to explain its pedagogical foundations and practice. As Dewey (1963:15) indicates: "this process can result in 'reconstruction' of experience (a re-codifying of habits – eg. overcoming racial bias), and ongoing questioning of old ideas (a habit of learning experientially)". As a result experiential learning transforms students, helps them revise and possibly enlarge knowledge and alters their practice (HEQC/JET, 2006:16). According to Keeton (1983) it affects the aesthetic and ethical commitments of individuals and alters their perceptions and interpretations of the world. With this pedagogy, community engagement and academic excellence are "not competitive demands to be balanced through discipline and personal sacrifice by learners, but rather independent dimensions of good intellectual work" (Wagner, 1986:17). The pedagogical challenge is "devising ways to

connect study and service so that the disciplines illuminate and inform experience and experience lends meaning and energy to the disciplines” (HEQC/JET, 2006:16-17).

For true service learning to occur according to Lauthar and Millner (2007) there must be:

- a) an academic course content within a discipline or field of study;
- b) an activity that meets a social need and civic responsibilities; and
- c) a reflective component such as personal journals, portfolios, in-class or on-line discussions, case studies, or essays.

What seems evident from the literature is that a central component of community-based education is reflection (Seifer, 1998; Eckenfels, 1997). In the absence of reflection, a service experience will merely constitute an event (Saltmarsh, 1996; Eyler and Giles, 1999:45). Reflection as a mode of inquiry is therefore key to gain meaning and education from a service experience (Eyler, Giles and Schmiede, 1996). According to Schön (1983:15), when the practitioner engages in reflection, “new satisfactions that open to him are largely those of discovery – about the meaning of his advice to clients, about his knowledge in practice, and about himself”.

Reflection can take place through writing or speaking about service experiences (Seifer, 1998). One particularly useful and common reflection tool is the critical incident analysis (Parker, Webb and D’Souza, 1995; Smith and Russel, 1991). For an experience to qualify as a critical incident, it could be positive or negative as long as it is meaningful, provokes thought, and raises professional and personal issues (Love, 1996). First described by Flanagan, this type of analysis enables students to write about and reflect on an experience/incident that occurred in a practice setting (Flanagan, 1954). Incidents are, therefore, snapshot accounts of views, thoughts, and feelings with respect to an experience that carries a particular meaning for the observer. In the health professions, incidents have been used in nursing to examine the role of the nurse and as catalysts for nursing students to learn from and make sense of their experiences (Parker, Webb and D’Souza, 1995).

The pedagogy of service learning has been used as a means of encouraging and or stimulating reflective thinking and or practice among health professions (Boyd, 2008). Boud, Keogh and Walker (1985) along with Schön (1987) put forward the idea that reflection includes two key concepts: reflection-in-action, referring to thinking whilst one is involved in practice and reflection-on-action, referring to reflective thinking that occurs after the experience has taken place. Both are relevant within a community setting. This perspective is further supported by Bringle and Hatcher (1999). Eyler and Giles (1999:) have found that in their own practices "...we have embraced the position that service-learning should include a balance between service to the community and academic learning and that the hyphen in the phrase symbolises the central role of reflection in the process of learning through community experience". In dental education, integration of reflection shows recognition that community-based education must not only strive to enhance the student's knowledge and clinical skills, but also facilitate their personal and professional development (Strauss, Mofidi, Sandler, Williamson, McMurtry, Carl and Neal, 2003).

Dental practice requires both reflection-in-action and reflection-on-action (Chambers, 2001; Boud, Keogh and Walker, 1985, 1996; Merriam and Caffarella, 1999). Reflection-in-action requires the "creation of new ways of thinking and acting about problems of practice" (Merriam and Caffarella, 1999:237). Reflection-on-action denotes thinking through a situation after it has happened, re-evaluating the experience, deciding what to do differently and trying out an alternative approach (Boud, Keogh and Walker, 1996). Thus, reflection-on-action "drives improvement and is mindful, purpose-driven and offers honest openness to what one is doing" (Chambers, 2001:161). Similarly within the context of service learning we have reflection before experience, reflection during experience and reflection after experience (Toole and Toole, 1995). Therefore, dental educators need to be cognisant that students need time in the dental curriculum to reflect to become competent at reflective practice (Hendricson, Andrieu, Chadwick, Chimar, Cole and George, 2006).

King and Kitchener (1994) have utilised Dewey's idea of reflective thinking (1963) and conducted extensive research to demonstrate the link between reflective thinking and epistemological beliefs. Epistemological beliefs refer to a person's belief about the nature of knowledge; King and Kitchener (1994) referred to the outcome of the reflective thinking process about ill-defined or ambiguous problems as reflective judgment. Within the context of service learning, students are exposed to ill-defined or ambiguous problems thereby stimulating their reflective judgment capabilities.

What then are the implications of the above for the practice and research of service-learning in dental schools? Experiences for example in the United States (Checkoway, 1996) have shown that many academics are trained in positivist research methods that discourage community participation in defining problems, gathering data and using results. In an unpublished paper, Fear, Bawden, Rosaen and Foster-Fishmann (2002) ground their approach to engaged learning (service learning) philosophically in a participatory worldview and they go on to differentiate the participatory worldview from the positivist worldview that they regard as a dominant worldview in science and in society. A participatory worldview lodges responsibility for learning in the hands of those who are most affected – people in context. A participatory worldview repositions knowledge from a commodity produced by experts to knowledge that people co-create and use (often with experts) in their settings (Fear et al. 2002:9). A participatory worldview is therefore inherently experiential, cooperative, interactive, and iterative, wherein those involved are “co-present” in the evolution of meaning and understanding. This perspective is in line with connected feminist epistemology (Howard, 1993; Stacey, Rice and Langer, 2001).

Much of the above has also been posited in the well known Mode 1 – Mode 2 knowledge production thesis of Gibbons (1998). Gibbons (1998) suggests that a certain impatience towards disciplinary science is emerging in the developing world and an understanding of complex problems is particularly relevant in the developing country context: “As soon as one begins to focus on understanding complex systems, the need for different types of expertise becomes obvious – and the need for partnerships and alliances becomes imperative” (Gibbons, 1998:54).

According to Fourie (2003) the unique role of universities as generators, transmitters and appliers of knowledge has assumed even greater importance in this era of globalization and the knowledge society. Furthermore, Braskamp and Wergin (1997, cited by Subotzky 1999:423) believe that “higher education today has an opportunity unique in its history to contribute to our society”. To play this role effectively institutions of higher learning should become active partners in addressing community development, among others, by means of service-learning. This therefore implies that service-learning should be allocated time in the curriculum. This perspective is highlighted by Coulehan (2005:894) who advised that “the minimal required ‘dose’ of community service must be sufficiently large for students to view it as integral to the culture of dental education and practice, rather than an unconnected add-on”. Several other papers elucidate and highlight this perspective (Littlewood, Ypinazar, Margolis, Scherpbier, Spencer and Dornam, 2005; O’Toole, Kathuria, Mishra and Schukart, 2005).

2.4 Self-directed learning

Self-directed learning involves the learner as an active participant and encourages the development of deep learning (Harden, Lever, Dunn, Lindsay, Holroyd and Wilson, 1969). Most of the current undergraduate training is didactic and pedagogical, with the teacher as a source of information transmitting it to the students, this encourages students towards surface learning (Yip and Barnes, 1997; Kelly, McCartan and Schmidt, 1999). Learner-centred learning, on the contrary, is an active process, where the student does “learn to learn” through his/her own “digging” or study (Barrows and Tamblyn, 1980:18). In addition, a learner-centred approach motivates students to adapt to new knowledge, challenges, and problems they will encounter in future in their professional life.

Also of importance is the fact that the key features of self-directed learning (Spencer and Jordan, 1999) are in synergy with the principles of adult learning (Knowles, 1990) and also with the findings of research in cognitive psychology (Regehr and Norman, 1996). According to Spencer and Jordan (1999) strategies that have been developed as self-directed learning include: problem-based learning; discovery-learning; task-based learning; experiential and reflective learning; portfolio-based learning; small-group, self-instructional, project-based learning and learning contracts.

The rationale for curriculum change can be illustrated by examining how the five principles of adult learning defined by Lindeman in 1926 and further discussed in Knowles, Holton and Swanson (1998), are at odds with a traditional dental school curriculum. These principles are:

- Adults are motivated to learn as they experience needs and interests that learning will satisfy;
- Adult's orientation to learning is life-centred;
- Experience is the richest resource for adults' learning;
- Adults have a deep need to be self-directing, and
- Individual differences among people increase with age.

It should, however, be pointed out that not all experts on education subscribe to the theory of adult learning. For example Norman (1999:887) argues that adult learning theory does not have a rigorous experimental basis. He agrees that adult learning theory is useful in the sense that it has put the focus of education on the learner, but suggests that allowing learners to be completely self-directed “flies in the face of a lot of knowledge about human foibles and the nature of professions”. However, the focus of this section of the review of the literature is on Lindeman's fourth principle as indicated above. This principle is not followed because in most traditional dental school curricula students are not very actively engaged in the learning process (Kassenbaum, Hendricson, Taft and Haden, 2004). The “principal objective of medical schools should be to encourage each student to assume responsibility for his or her own learning” (Tosteson, 2003:15). A shift in emphasis from teaching to learning is needed, specifically, there needs to be recognition of the importance of the learners' self-awareness during the learning process (Ericsson, Krampe, Tesch-Romer, 1993). Students must learn to be self-directed and to manage their learning effectively. They have to be aware of how they learn best and have to develop strategies to balance competing demands on their learning (Crawford, Adami, Johnson, William Knight, Knoernschild, Obrez, Patston, Punwani, Zaki and Licari, 2007). They also have to monitor information for meaning in the context of their learning (Lonka and Aholor, 1995). They have to be able to evaluate their own performance against established norms (Entwistle and Ramsden, 1983; Biggs, 1993). These skills are examples of metacognition: “learning to learn”. Metacognition has been defined

in various ways, but in this case, according to Winn and Snyder (1996), it is monitoring one's progress as one learns and making changes and adapting strategies if you perceive that you are not doing well or receive negative feedback. One way to enhance metacognitive skills is to provide students with more formative assessments and provide them with environments and opportunities for reflection on learning (De Paola, 2008).

Learning does take time, and, in a variety of learning situations, the time needed is roughly proportional to the amount to be learned (Crawford et al., 2007). Even talented individuals require a great deal of practice to develop expertise (Ericsson, Krampe, Tesch-Romer, 1993). However, studies indicate that learning is facilitated if it is actively monitored and feedback about progress is included (Ericsson et al., 1993; Bransford, Brown, Cocking, 1999).

Some learners do not acquire the tools to adapt to other types of problem solving; they are unable to transfer learning (Lonka, 1997). It is argued by Harris, Bransford and Brophy (2002) that traditional teaching methods are not effective in developing the ability to transfer learning to different contexts (they call this "adaptive expertise"). Other methods of teaching and learning that focus on understanding, self-assessment, and reflection have been shown to increase the ability of learners to adapt to new conditions and perhaps become lifelong learners (Palinscar and Brown, 1984; Scardamalia, Breiter and Lamon, 1994).

As Chickering and Ehrmann (1996:4) succinctly state, "learning is not a spectator sport". Knowles, Holton and Swanson (1998) remind us that pedagogy originated in medieval European monastic and cathedral schools and that the educational model has still not evolved significantly from the concepts developed in early beginnings. In this pedagogical model, the teacher makes all decisions about what is to be learned, how it will be learned, when it will be learned, and if it has been learned (Crawford et al. 2007). The student passively follows the teacher's instructions. One way that students can be engaged more actively in the learning process is with small group activities (Lonka, 1997). One of the seven principles for good practice in undergraduate education proposed by Chickering and Ehrmann (1996:5) is "good practice develops reciprocity and cooperation among students ". They add that good learning is collaborative and social, not competitive and isolated.

After an analysis of several publications, using a diverse number of outcome measures, Springer, Stanne and Donovan (1999) and Johnson, Johnson and Stanne (2005) concluded that learning in groups was superior to individual learning. Their findings suggested that various forms of small group learning were effective in promoting greater academic achievement and more favourable attitudes towards learning. Heller, Keith and Anderson (1992), as well as Springer et al. (1999) reported on an investigation of the effects of cooperative group learning on the problem-solving performance of college students in a large introductory physics course. They found that better solutions to problems emerged through collaboration than were achieved by even the best individuals working alone. Importantly group learning improved the problem-solving performance of students at all ability levels. However, Colliver, Feltovich and Verhulst (2003) strongly disputed the conclusions of Springer et al. (1999). They criticised the design of some of the studies included by Springer et al. (1999) and the relevance by other studies to the conventional model of small group learning. Colliver et al. (2003) claimed that the evidence presented did not support the widespread implementation of small group learning in undergraduate science, mathematics, engineering and technology courses.

The importance of active involvement in the learning process, problem solving, and the advantages of group learning are important components of self-directed learning (Crawford et al., 2007). As indicated by Hmelo-Silver (2004), problem-based learning (PBL) is a curriculum designed to provide students with guided experience in learning through solving complex, real world problems.

The capacity for self-directed learning is required to implement the reflective judgment process and underlines many of the dispositions needed for critical thinking (Hendricson et al., 2006). Self-directed learning can also be viewed as the ability to direct and regulate ones' own learning experience (Pyle and Goldberg, 2008). Essentially the same educational strategies have been proposed to develop critical thinking and self-directed learning (Hendricson et al., 2006). The best practices include providing students with frequent opportunities to use reflective judgment processes to analyse problems presented in case scenarios or during the elaborate simulations used in their professional training (King and Kitchener, 1994). The data seeking and analysis required to accomplish the reflective judgment process are thought to help students acquire

self-directed learning skills in a “learn by doing” approach, and there is evidence that students who routinely use this process to explore problems develop more sophisticated self-directed learning than do students in lecture-based curricula (Biggs, 2003). Implementation of this reflective judgment process with emphasis on student-directed exploration of the literature represents the core elements of problem-based learning, this process has been employed widely as a curriculum model in medical and nursing education with generally positive acceptance by members of the academic staff and students, but to a much lesser extent in dental education as previously indicated (Hendricson and Cohen, 2001; Kassebaum, Hendricson, Taft and Haden, 2004).

2.5 Problem-based Learning (PBL)

For purposes of this study I reviewed the literature under two main headings, viz. foundations of PBL, and why is PBL important in health sciences education?

2.5.1 Foundations of PBL

Problem-based learning (PBL) is an educational method that is grounded in constructivism (Savery and Duffy, 1995). Although it was first introduced in medical education more than thirty years ago at McMaster University, its scientific and philosophical foundations are found in the earlier work of Dewey (1938), Piaget (1987), Vygotsky (1962), Bruner (1966), Kelly (1966) and others.

In constructivism, the learning is at the centre and the learner must participate in generating meaning or understanding (Savery and Duffy, 1995). The learner cannot passively accept information by mimicking the wording or conclusions of others. Rather, the learner must engage herself or himself in internalizing and reshaping or transforming information via active consideration (Marton and Säljö, 1997). The learner constructs understanding from the inside, not from an external source (Schmidt, 1993). In formulating such understanding, the student connects the new learning with already existing knowledge, that is, prior experiences (Ausubel, 1968). This learning is optimised when the student is aware of the processes that he or she is structuring, inventing and employing – this phenomenon is known as metacognition (King and Kitchener, 1994) as previously indicated.

That the learner constructs understanding and knowledge from the inside is central to constructivism, especially that portion of constructivism that is in the radical camp. Although there may exist a real world out there about which we wish to learn, the meaning of the world does not exist independently of students. Meaning is imposed on the world by those who reflect, those who think about the world (King and Kitchener, 1994). Meaning does not exist in the world independent of us. It is we (students and learners) who structure the world, as we construct reality so as to comprehend it, i.e. students do not simply “bank” knowledge from the external world into their memories (Kelly, McCartan and Schmidt, 1999).

Although there is general agreement on the basic tenets of constructivism, the consequences for teaching and learning are not as clear cut (Schmidt, Norman and Boshuizen, 1990). It is generally agreed that learning involves building on prior experiences, which differ from learner to learner (Lancaster, Bradly and Smith, 1997; Kaufman and Mann, 1996). Consequently, each learner should have a say in what they are to learn, different learning styles and orientations must be catered for and information must be presented with a context to give learners the opportunity to relate it to prior experience.

It is also generally agreed that the process of learning is an active one, so the emphasis should be on learner activity rather than teacher instruction (Hendricson et al., 2006).

Radical constructivists claim that learners should be placed within the environment they are learning about and construct their own mental model, with only limited support provided by a teacher or facilitator (Norman and Schmidt, 1992; Schmidt, 1993). More moderate constructivists claim that formal instruction is still appropriate, but that learners should then engage in relevant activities to allow them to apply and generalise the information and concepts provided in order to construct their own model of the knowledge (Perkins, 1991).

A third dimension is the view that knowledge construction occurs best within an environment that allows collaboration between learners, their peers, experts in the field and teachers (Regehr, Martin and Hutchinson, 1995).

These different interpretations of constructivism have been labelled by Moshman (1982:373) as endogenous, exogenous, and dialectical, as follows:

- Endogenous constructivism emphasises the individual nature of each learner's knowledge construction process, and suggests that the role of the teacher should be to act as a facilitator in providing experiences which are likely to result in challenges to learners' existing models.
- Exogenous constructivism is the view that formal instruction, in conjunction with exercises requiring learners to be cognitively active, can help learners to form knowledge representations which they can apply later to realistic tasks.
- Dialectical constructivism is the view that learning occurs through realistic experience, but that learners require scaffolding provided by teachers or experts as well as collaboration with peers.

Furthermore, constructivist learning theoreticians generally agree that a social learning environment where the learner interacts with other learners in small groups as opposed to an individual or isolated non-social learning environment, is more conducive to learning (Shuler and Fincham, 1998). Studies by Vygotsky emphasise that learning is a social activity. Vygotsky argues that: "learning awakens a variety of internal development processes that are able to operate only when a person is interacting with people in his/her environment and in cooperation with peers" (Vygotsky, cited in Bennet and Dunne, 1992:3). According to Vygotsky, the learning potential is realized during interaction with more knowledgeable others. A "more knowledgeable other" could be any person whose construct of reality is more advanced or more complete, meaning another student, the teacher, or anybody else. One of Vygotsky's most prominent contributions to understanding the learning phenomenon is his concept of the zone of proximal development (ZPD). This zone indicates the difference between what learners can achieve on their own and their achievement through interaction with more knowledgeable others.

A social constructivist view of learning has directed attention to the role of dialogue in learning (Cazden, 1988). As the role of peers in teaching each other is based on the notion that because learning is social in nature, students ought to be provided with opportunities to interact with one another.

The purpose of peer interaction is to make the implicit nature of social learning explicit by encouraging active learning within a social setting (Hertz-Lazarowitz and Miller, 1992).

The application of constructivist pedagogy provides an opportunity for innovations which are based on the notion that reflection and metacognition are most likely to develop into meaningful social interaction among students themselves, staff and students and thereby establish what Gravett (2004:30) refers to as a “community of inquiry and interpretation”. The challenge is to provide learning environments which foster the development of expertise in our students (Licari, 2007). Teachers or facilitators of learning apparently have to diagnose and activate their thoughts, support their learning process, and give students constructive feedback during all phases of their learning (Lonka and Ahola, 1995).

2.5.2 Why PBL is important in health sciences education

If PBL is used properly, it could (according to Davis and Harden, 1999) result in several advantages for any teaching programme:

- Relevance: Relevance of curriculum content is facilitated by structuring student learning around common clinical problems (Fish and Coles, 2005). PBL helps to eliminate much of the irrelevant and outdated teaching currently cluttering undergraduate training programmes (Bertolami, 2001).
- Identification of core: The PBL approach, through its identification of core has the potential to make an important contribution towards the reduction of information overload that overburdens many of our students (Oliver et al., 2008).
- Generic competencies: The approach contributes to the acquisition of generic competencies or personal transferable skills such as problem solving, communication and team building, essential for all graduates of higher education. It thus helps develop education for capability, another important trend (previously reviewed) in health professions education which enables graduates to “hit the ground running” on entering their first step on the career ladder (Fraser and Greenhalgh, 2001; Hilton and Slotnick, 2005).

- Student centred: The PBL process involves the student taking more responsibility for his or her learning, a feature that is thought to prepare students for learning in later life (Pyle and Goldberg, 2008). The speed of developments and of innovation in patient care and in health care delivery requires all health professionals to make a commitment to keeping up to date through lifelong learning (Formicola, Bailit, Beazoglou and Tedesco, 2008). PBL helps to prepare students for the adult learning approach they will need to employ later, in the continuing education phase of their professional life (Pyle and Goldberg, 2008). The move away from passive learning and rote memorization, towards a more active approach in which the student is actively engaged in the learning process, can improve understanding and retention of what has been learned by promoting a deeper approach to learning (Biggs, 2003; Licari, 2007; Kelly, McCartan and Schmidt, 1999).
- Integration: Integration has been shown to bring real benefit to student learning (Schmidt, Norman and Boshuizen, 1996). PBL is an important educational strategy for integrating the curriculum as indicated by the spiral curriculum introduced by Harden, Davis and Crosby (1997) and further elucidated by Harden and Stamper (1999).
- Motivation: PBL is fun and rated enjoyable by both students and staff (Bernstein, Tipping, Bercovitz and Skinner, 1995). Teachers in traditional curricula are familiar with the spectre of listless students, switched off by the information overload which has been a feature of undergraduate medical education for at least the past 100 years (Prideaux, 2005). Courses that depend largely on information gathering will direct students' learning styles towards rote learning of facts and information and as a result encourage superficial learning (Prideaux, 2005). One of the most widely accepted merits of PBL is its ability to motivate or re-motivate students by freeing them from rote learning (Davis and Harden, 1999).
- Deep approach to learning: PBL encourages a deep approach to learning (Schmidt, Norman, Boshuizen, 1996). During the PBL process, students interact with the learning material more than in an information gathering or theoretical approach (Fincham and Shuler, 2001). Concepts are related to

everyday experience and evidence is related to conclusions. These are features of the deep approach to learning. If, as teachers, we wish to foster and encourage deep as opposed to surface learning in our students, then we should consider using PBL as a tool or strategy (Farmer, 2004). The advantages of a PBL curriculum have been well articulated in the literature, particularly by those who have adopted it into their teaching and learning programmes. Marton and Säljö (1997:20) suggested that “for too long PBL has been viewed as self-evidently ‘better’ approach to health sciences education, despite an accumulation of evidence that the outcomes are not much different”.

Barrows and Kelson (1995) define the goals of PBL as helping students:

- develop effective problem-solving skills
- develop self-directed, lifelong learning skills
- become effective collaborators, and
- become intrinsically motivated to learn

There is an abundance of literature examining the effectiveness of PBL in a variety of learning environments, particularly in undergraduate medical education (Newman, 2006). Reviewers of this literature have described the difficulties in formulating conclusions from this body of work. A major difficulty according to Crawford et al. (2007), is the variety of pedagogies described under the rubric of PBL, which is practiced very differently in different institutions. Other difficulties include the complexity of the PBL (mainly in undergraduate medical programmes) Newman (2006) concluded that existing reviews of PBL do not provide robust evidence for its effectiveness process itself in terms of small group discussions, case-based learning, ability of facilitators to name but a few (Crawford et al. 2007). Some reviewers (Albanese, 2000; Newman, 2006) have questioned the use of conventional outcomes to measure the effects of PBL because the presence of the multiple PBL components confounds the search for cause and effect relationships.

In a pilot systematic review of twelve studies on the effectiveness of PBL Colliver (2000) stated bluntly in his review of PBL research that there is no conclusive evidence that PBL improves knowledge base and clinical performance. Norman and Schmidt (2000) agreed with Colliver's conclusions that research into PBL does not reveal dramatic differences in cognitive outcomes. However, Norman and Schmidt concluded that standard curriculum intervention studies (comparing a group of students trained by PBL to a traditionally trained group) could not be used as a methodology to evaluate PBL because it is impossible to maintain blinding in the study design, it is difficult to measure the outcome, and it is impossible to make the intervention uniform. Hmelo-Silver (2004) examined the evidence whether PBL helps students in the four domains defined by Barrows and Kelson (1995), described above. She found some support that PBL is superior to traditional curricula in the first three domains, but insufficient research has been done in the last domain. In a long-term follow-up of the New Pathway (NP) programme at Harvard Medical School (primarily a PBL curriculum), Peters, Greenberger-Rovosky, Crowder, Block and Moore (2000) looked for differences between NP and traditional students in three domains – humanism, lifelong learning and social learning - eight to nine years after graduation they found significant differences in five of a total of twenty-two measures, all of which were in the humanism domain. Hendricson and Cohen (2001) discuss some of the barriers that have prevented the more widespread adoption of PBL in dental education. They cite the focus of PBL on differential diagnosis compared with the focus of traditional dental school curricula on treatment; the density of the dental school curriculum; not allowing the time for problem solving that is at the heart of PBL; academic staff concerns about the resources needed for PBL; and the unfamiliarity of dental school academic staff with the PBL process.

Hemker (1998), writing from the perspective of a teacher in the Biochemistry Department in the Medical Faculty at Maastricht University, identified some disadvantages for PBL:

- The knowledge acquired through PBL tends to remain unorganised. Organization of knowledge in traditional courses comes from students being introduced to a topic by experienced teachers able to distinguish between what is important and what is unimportant. The use of study guides may overcome this potential disadvantage.
- PBL requires competencies many teachers do not possess (Irby and Wilkerson, 2003). Teachers in medicine tend to teach as they themselves were taught using traditional approaches (Irby, 1996). Staff development programmes must be significantly robust to meet these challenges.
- Concern has also been expressed about the cost of implementing a PBL programme. PBL, however, is not necessarily more expensive than traditional approaches (Schmidt, Norman and Boshuizen, 1996).
- PBL may be time consuming for students, particularly if they need to identify educational resources for themselves (Farmer, 2004). The use of study guides, which identify the most appropriate learning material, will minimise this potential drawback.

It is argued from the literature that PBL is more effective than learning based on established disciplines and solves some problems of the traditional curriculum (Fincham and Shuler, 2001).

Another strategy, which has similarities with PBL is task-based learning. (Harden, Laidlaw, Ker and Mitchell, 1996). In PBL, a small group of learners tackles a paper simulation. In task-based learning, the focus for the learners is not paper simulation but an actual task addressed by healthcare professionals.

2.6 Integration and early clinical contact

The move away from discipline-based teaching towards integration of the curriculum occurs in two distinctive ways – multi-professional and multi-disciplinary (Harden, 1998; Bligh and Parsell, 1999; Fallsberg and Wijma, 1999; Forman and Nyatanga, 1999; Hurst, 1999; Parsell and Bligh, 1999).

In multiprofessional education, students of different professions in health sciences (eg. medicine, dentistry and nursing) are taught together in certain appropriate situations (WHO, 1987). The approach encourages development of the student's ability to share knowledge and skills, enhances personal and professional confidence, helps attainment of respect between professionals, prompts reflective practice and ensures quality of health services (Bajaj, 1994; Harden, 1998; Mires, Williams, Harden, Howle, McCarey and Robertson, 1999).

In multidisciplinary integration, courses may be integrated horizontally, where topics traditionally taught separately in one level of the course are taught together, or they may be integrated vertically where topics can be taught by two or more departments. Vertical integration is also associated with the earlier introduction of clinical work incorporating basic science throughout the undergraduate programme (Snyman and Kroon, 2005). This strategy was found to be a more effective way of preparing students for their future roles (WFME, 1988; Kaufman, Mennin, Waterman, Duban, Hansbarger, and Silverblatt, 1989) and as a result they tend to perceive the relevance and value of what they are learning in a positive way. The whole process of integration and early clinical contact will, however, be largely determined by the design of the curriculum (Bligh, 1998).

Within the context of vertical integration a topic is revisited throughout the duration of the curriculum, with further information being added to the sum of knowledge year by year; a process termed concentric spiral learning (Oliver et al., 2008). On the other hand horizontal integration means that a topic is taught by different groups of staff (perhaps departments or themes) without undue overlap of information also referred to as thematic teaching (Grundy, 1994; Prideaux, 2005). This term might also include learning and teaching of topics between multi-professional groups of students and would incorporate the concept

of teamwork (Oliver et al., 2008). A combination of vertical and horizontal integration has been described as a spiral curriculum (Harden and Stamper, 1999). The advantages of this approach are that topics are revisited more than once in the programme, with an increasing level of difficulty or complexity on each occasion, the new learning being linked with the previous one, and as a consequence, the knowledge and skills of the learner increase until competence is achieved.

Within the South African higher education landscape there are two contending discourses over the structuring of higher education curricula viz. a disciplinary discourse and a credit accumulation and transfer discourse (Ensor, 2002). The traditional disciplinary discourse is enunciated and supported by academics who argue that education should be an apprenticeship into powerful ways of knowing: of modes of analysis, of critique and of knowledge production. Emphasis is placed on mastery of conceptual structures and modes of argument, which form the basis for the production of new knowledge (Ensor, 2002). In large measure, this therefore means that academic productivity derives from an inward focus upon the development of concepts, structures and modes of argument, rather than outwards upon the world. In this sense the disciplinary discourse has an intro-jjective orientation (Ensor, 2002).

A further important feature of the disciplinary discourse is its underlying assumption that students, the “to-be-apprenticed”, enter the university with sets of experiences which are other than the knowledge forms into which they are to be inducted (Ensor, 2002; Fraser and Bosanquet, 2006). In this respect, the disciplinary discourse rests upon explicit, vertical pedagogic relations between adepts and novices, with the rules of selection of curriculum content and of evaluation residing in the hands of academics (Fraser and Bosanquet, 2006). The disciplinary discourse is teacher-directed and product oriented (Fraser and Bosanquet, 2006).

The credit accumulation and transfer (CAT) or credit exchange discourse is articulated by those who advocate the speediest integration of South Africa into a globalising world economy, to be achieved, *inter alia*, by a university sector that orients its activities towards producing highly skilled graduates for the workplace (Ensor, 2002). A key characteristic of this discourse is modularisation of the

curriculum and description of modules in terms of outcomes that can be matched and exchanged as part of a process of accumulating credit towards academic qualifications (Ensor, 2002; Harden and Crosby, 2000). Modularisation of the curriculum has the function of disaggregating traditional extended university courses; the specification of outcome allows modules to be evaluated against each other for the purpose of equivalence. For the advocates of the credit accumulation and transfer approach, the National Qualifications Framework (NQF) is to function as a “clearing house”, allowing modules to be matched and exchanged (Ensor, 2002).

Along with modularisation, comes a shift from departments to programmes, looser frameworks that allow the credit accumulation to operate, and a paradigm shift from subject-based teaching to student-based learning (Harden and Crosby, 2000). In this scheme of things, an academic as a teacher is to act as a “facilitator rather than expert”, one who should place emphasis on competence or skills rather than knowledge or content (Harden and Crosby, 2000; Fraser and Bosanquet, 2006; Ensor, 2002). In other words, the vertical pedagogic relations associated with academic apprenticeship into domain-specific knowledge favoured by a disciplinary discourse are to be eroded in order to facilitate integration of knowledge (Fraser and Bosanquet, 2006). Disciplinarity must give way to inter-disciplinarity, which must be the basis for a re-constituted and relevant curriculum (Ensor, 2002). Trans-disciplinarity is a central feature of the Mode 2 forms of knowledge production that Gibbons (1998: 28-29) describes. The spread of Mode 2 and trans-disciplinarity has the following implications for the curriculum according to Gibbons (1998:40).

- It requires a shift from discipline-based learning to problem-based learning. For example, some medical schools have reviewed the normal approach to medical training based upon prior learning of the basic sciences such as biology, chemistry, anatomy and physiology before interacting with patients, in favour of teaching potential doctors how to build up “repertoires of problem-solutions”. The belief is that by using a problem-based approach students will gradually pick up much of the knowledge that they would have acquired by going the other way around i.e. beginning with anatomy and going on to the fundamental sciences and on from there to symptoms.

- It is associated with the use of increasingly technical instrumentation, including computer simulations and modeling thereby encouraging self directed learning.
- It requires the ability to work with complex models in which the correlations identified and laws induced are not reducible to those of a particular discipline.

Trans-disciplinarity is also manifesting itself in higher education curricula primarily in the emphasis on generic skills (the NQF promotes this through “critical cross-field outcomes”).

According to Hendricson and Cohen (2001) the dental education reform agenda should argue for a learning environment that encourages students to learn collaboratively, must provide students with opportunities early in the curriculum to practice application of newly acquired biomedical information by solving patient problems, fosters longitudinal contact between instructors/facilitators and small groups of students, and provides learners with continuous contact with patients and their health problems throughout the educational programme. These concepts are consistent with contemporary educational theory and are based on the inquiry-driven learning that students use to convert unorganized static information (i.e. data “sponged” from a text or a lecture), into the interlinked chains of networked knowledge (i.e. information that has meaning, utility, priority, and interconnections to other data) that experts access to solve problems (Regehr and Norman, 1996; Hendricson and Kleffner, 1998).

2.7 Evidence-based health sciences education

In discussing this emerging concept in health sciences education, there will firstly be a review of the need and problems associated with evidence-based teaching, the concept of best evidence medical education and evidence-based approach to learning and teaching.

2.7.1 The need for evidence-based teaching

There can be few subjects, if any, where there is as great a degree of internal dissension as education (Squires, 1999). There are tensions as to what is taught and how it is taught, with the curriculum destined, many would argue, to remain an area of conflict (Masella, 2005). In medical education, change is very much on the political, professional and public agenda (Pyle and Goldberg, 2008). Reports from bodies such as the General Medical Council (1993) in the United Kingdom, the World Federation for Medical Education (WFME, 2000) and the Association of American Medical Colleges (1994, 1998) in the United States of America argue powerfully for revisions to the medical curriculum and for changes in teaching practices. Individual teachers engaged in undergraduate, postgraduate and continuing education are caught up and struggle with this movement for change (Pyle and Goldberg, 2008; Masella, 2005; Pyle, Andrieu, Chadwick, Ohmar, Cole and George, 2006). It needs to be questioned whether a new approach that has been advocated would work in practice and whether will it prove to be better or worse than what teachers are currently doing (Harden, Grant, Buckley and Hart, 1999). “It is often unclear,” Davies (1999:112) concluded, “whether developments in educational thinking and practice are better, or worse, than the regimes they replace”. New approaches may be introduced in medical education with much rhetoric but little real, reliable or valid evidence (Davies, 1999; Biesta, 2007; Masella, 2005).

It would appear that education often develops and changes simply on the basis of new ideas promoted with missionary zeal, new theories with very little evidential basis and the social and political values of the moment (Harden, Grant, Buckley and Hart, 1999). Very often, ideas which have no evidential basis become so ingrained by constant repetition and reassertion that the emperor’s new clothes almost seem to be real (Harden, Grant, Buckley and Hart, 1999; Masella, 2005).

Therefore, we as teachers need to think more critically about current educational practice and about new approaches to medical education. The need for evidence-based medical education is highlighted in editorials in *Medical Teacher* (Harden, 1998; Hart, 1999), and in the *British Medical Journal* (Petersen, 1998:1223), which suggests that “the evidence base is as important in educating

new doctors as it is in assessing a new chemotherapy". "Ultimately research into teaching and learning in medicine", argue Bligh and Parsell (199:162), "has its impact at the bedside, in the consulting room and in the wider community. Research in medical education matters".

2.7.2 Problems with evidence-based teaching

There is a widely held view among clinicians, medical researchers and medical teachers that evidence to support or reject educational approaches is not available (Grol, 2001b). This may be true in some areas but not in others. In the area of teaching and learning communication skills in medicine for example Aspegren (1999) identified 180 pertinent papers including 31 randomised studies. Powis (1998) studied approaches to student selection and described an evidence-based Admissions Process at Newcastle (New South Wales) Medical School. "There is a huge body of research evidence out there but it is either not known about or ignored", suggests Gibbs (1995:25). "It is hard to imagine what further research on lecturing, for example, could make any difference to the business of changing compulsive lecturers' minds" (Gibbs, 1995:26). Evidence is, however, frequently ignored (Hargreaves, 1996) and there is at present, a gap between educational researchers and users of educational research. Campbell and Johnson (1999), for example, concluded, on the basis of a literature survey restricted to Medline, that there was no evidence to support multi-professional or multimedia education. Such a restricted literature survey excludes many research studies that address these areas. Lack of evidence should not be used by teachers as an excuse for a failure to adopt an evidence-based approach to their teaching practice (Harden, Grant, Buckley and Hart, 1999; Masella, 2005).

In medicine, evidence-based practice has been widely accepted and has been defined as "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients" (Sackett, Straus, Richardson, Rosenberg and Haynes 2000:20). Since its inauguration in 1993, the international Cochrane Collaboration has grown to consist of about 50 Collaborative Review Groups whose members are preparing and maintaining systematic reviews of the effects of health-care interventions (Chalmers, Sackett and Silagay, 1997). Why are the same principles not applied to teaching? It has been argued that there are problems of measurement and causation in

educational research that are not found in medicine (Labaree, 1998). Labaree (1998:6) contrasts the hard knowledge of the natural sciences with the soft knowledge produced by the humanities and social sciences: “Researchers and practitioners in these areas pursue forms of enquiry in which it is much more difficult to establish findings that are reproducible and where validity can be successfully defended against the challenge of others”. Compared with medicine, research in education may be more complex, confounding factors may be more apparent, content may be more implicit and controlled trials may be difficult. Moreover, the impact of education in patient care and the health of the community is less direct than with medical interventions such as a new drug or surgical procedure (Harden, Grant, Buckley and Hart, 1999). As a result, Belfield, Thomas, Bullock, Eynon and Wall (2001:165) suggest that “the epistemological assumptions underlying evidence-based medicine are inappropriate for medical education. The resulting straight-jacket would severely limit the expression of medical education research and practice”. Many would disagree with this view and Davies (1999) had argued that, when compared with medicine, education faces very similar, if not identical, problems of complexity, context specificity, measurement and causation. Many of the problems about the complexity of education and social interventions and their evaluation apply to health care as well.

2.7.3 The concept of best evidence medical education (BEME)

Given the above mentioned problem, it is not surprising that opinion about the application of the findings of research in medical education is polarized, with the choice presented as “evidence-based” teaching or “opinion-based” teaching. A more helpful view of evidence-based teaching is to view it as a continuum between 100% opinion-based education at one end of the spectrum where no useful evidence is available, and 100% evidence-based education at the other where decisions can be taken on the basis of detailed evidence (Harden, Grant, Buckley and Hart, 1999:554).

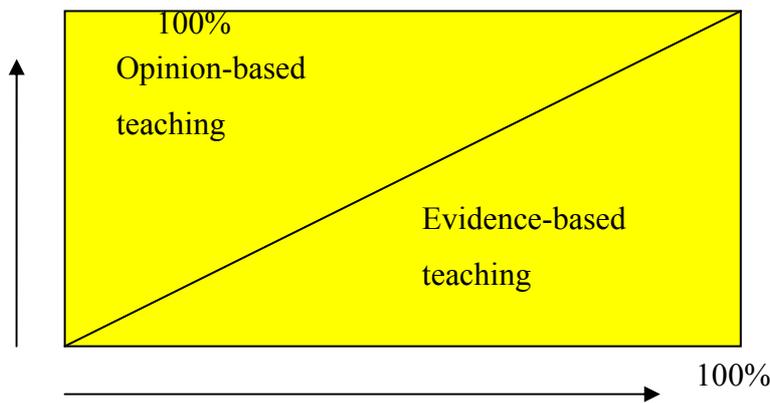


FIGURE 3: BEST EVIDENCE MEDICAL EDUCATION CONTINUUM

(Adapted from Harden, Grant, Buckley and Hart, 1999:554).

In best evidence medical education teachers make decisions about their teaching practices on the best evidence that is available at whichever point they find themselves on the continuum. Hart (1999:5) has suggested that “Taking a best-evidence based approach to medical education forces educators to:

- 1) Comprehensively critically appraise the literature that already exists in the area, and categorise the power of the evidence available, and
- 2) Identify the gaps and flaws in the existing literature and suggest (and if possible carry out) appropriately planned studies to optimize the evidence necessary to make the proposed, educational intervention truly evidence based”.

2.7.4 Evidence-based healthcare curriculum

The principles and processes of best-evidence medical education should be infused as far as possible in a modern and progressive curriculum (Winning et al., 2008). According to Sackett, Straus, Richardson, Rosenberg and Haynes (2000) the following proposed approach for an evidence-based curriculum draws on social constructivist, cognitive and behavioural theories of learning and is characterised as being:

- Patient-centred
- Learner centred

- Active and interactive
- Modelled as essential to becoming an expert clinician
- Match, and take advantage of, the clinical setting and circumstances
- Well-prepared
- Multi-staged.

The elements of this approach are consistent with contemporary approaches to learning (Biggs, 2003; Ramsden, 2003) and healthcare education (McNeil, Hughes, Toohey and Dowton, 2006). Comparison of this approach with more conventional approaches to learning in clinical settings can be summarized as follows:

TABLE 1: COMPARISON OF LEARNING IN CLINICAL SETTINGS FOR CONVENTIONAL AND EVIDENCE-ORIENTED APPROACHES

CONVENTIONAL APPROACH	EVIDENCE-ORIENTED APPROACH
Knowing what you are supposed to know	Knowing your knowledge gaps and how to manage them
Uncertainty discouraged and ignorance avoided	Uncertainty legitimized through learning by questioning
Focus on authority apprenticeship and learning from accepted wisdom	Focus on clinical evidence, assessment and ability to challenge accepted wisdom
Learning by discreditation: name and blame those who do not know	Learning by converting problems into questions and solving them by finding, appraising, storing and acting on experience and evidence
Unsystematic observations, including case series, accepted as evidence of effectiveness	Systematic reviews of scientific studies accepted as evidence of effectiveness

(Source: [Winning, Needleman, Rohlin, Carrassi, Chadwick, Eaton, Hardwick, Ivancakova Jallaludin, Johnsen, Kim, Lekkas, Li, Onisei, Pissiotis, Reynolds, Tonsu, Vandebergen, Vassileva, Virtanen, Wesselink and Wilson, 2008](#))

Currently, in health sciences education, a trend has emerged to utilize “trustable research findings” in place of “personal opinions” as a basis for educational management and decision-making. Opinion-based decision-making practiced in

most health sciences faculties in curriculum development and other educational planning involves “debates over assumptions, cherished traditions, and quaint myths” (Jason, 2000:10). The educational community is also becoming more aware of the importance of evidence in educational decision-making (Stevenson, 2006). It is also expected that educational researchers, teachers, academic administrators, health managers, care-providers and policy-makers, join together to develop strategies, and set priorities to enable educational research to guide the future of health sciences education (Boelen and Heck, 1995; Bligh and Parsell, 1999; Jason, 2000).

2.8 Communication and information technology

Recent and rapid advances in communication and information technology (C&IT) together with the pervasion of the worldwide web into everyday life have offered many changes and challenges to health sciences education (Gupta, White and Walmsley, 2004). Medical and dental schools around the world have invested heavily in computer facilities, not only to attract the best students but also because C&IT and informatics skills are seen as essential in a profession that is increasingly dependent on electronic information (Rajab and Baqain, 2005). Medical and dental schools should use all the educational possibilities of C&T, either in the classroom to educate students in such a way that they use this technology in their efforts at self-directed learning (Dalgarno, 2001).

Such explosion of technology has also encouraged health sciences education to turn gradually to web-based instruction (Harden and Hart, 2002), e-learning (Harden, 2002) and virtual education (Mattheos, Stefanovic, Apse, Attstrom, Buchanan, Brown, Camilleri, Care, Fabrikant, Gundersen, Houkala, Jojnsen, Jonas, Kavadella, Moreira, Peroz, Perryer, Seemann, Tansy, Thomas, Buruta, Uribe, Urtane, Walsh, Zierman and Walmsley, 2008). However, for this type of education to be successful, particularly in developing countries, health sciences students must have access to computers and the Internet as well as a positive attitude toward this form of learning (Rajab and Baqain, 2005). In addition, teachers must provide guidance in order to stimulate self-directed learning (Mattheos et al. 2008).

Furthermore, one of the many proposed dental education reforms is to “use the capacities of information technology to enrich and diversify students’ learning experiences” (Kassebaum, Hendricson, Taft and Harden, 2004:920). This perspective is further supported by Hendrickson and Cohen, 2001 as well as De Paola and Slavki, (2004). According to Gupta, White and Walmsley (2004) many members of faculty are not comfortable using new technology and they suggest that support needs to be provided to encourage them to effectively use technology to its fullest extent.

Mattheos et al. (2008) clearly state that information technology should be used to:

- enrich instructional interaction;
- allow flexibility of structures and support individual learning paths;
- enable reflection, self- and peer assessment;
- promote the development of life-long learning attitudes;
- encourage active learning, collaborative and peer learning; and
- support face-to-face teaching through blended learning environments.

Self-instruction has been shown to be an effective method of learning in dental education (Rosenberg, Grad and Matear, 2003). A meta-analysis of self-instruction in dental education by Dacaney and Cohen (1992), integrating findings from thirty-four comparative studies, showed that educators who individualise their classes could expect, on average, a small to moderate positive effect on achievement. Their conclusions were in accordance with a study by Williams (1981) where it was found that self-instruction was capable of increasing cognitive knowledge significantly in a shorter period of time and with greater student satisfaction over conventional methods.

One such means of providing self-instruction is through computer-based instructional programmes. Computer-based, self-instructional programmes provide an accessible, interactive, and flexible way of giving multimedia presentations that utilise textual materials, visuals, sound and motion (Rosenberg et al., 2003). Computer programmers complement conventional teaching while providing a means for students to learn at their own pace (Mattheos et al., 2008).

Computer-Based Instruction (CBI) in the health profession, also known as Computer-Aided Learning (CAL) or Computer-Aided Instruction (CAI), is

becoming a popular vehicle to provide information to students, and practitioners alike, the assumption here being that the modern day teacher will use it as a form of teaching and learning (Mattheos et al., 2008).

As a general remark, it is worthwhile to note that there are health sciences educators who desire change, and those who fear change - especially that most of the current teachers in health sciences faculties are essentially products of the traditional curriculum (Masella, 2005).

While many things mold the dental school learning environment, according to Masella (2005:1090), "the major artisan for student learning is the teacher whose work penetrates to unnumbered patients who (someday) will profit or suffer from encounters with (his or her) students".

2.9 Conclusion

As earlier indicated Cornbleth (1990:6) has described the curriculum as "an on-going social process comprised of the interaction of students, teachers, knowledge and milieu". Within the South African context the legislative framework for higher education has assisted in facilitating transformation of higher education as well as providing the milieu that would influence change at various levels within health sciences institutions including curriculum change. This change in the curriculum must have ownership by all stakeholders including teachers themselves. Teachers need to be involved in the change process and must be central to any curriculum development or change process. As indicated by Ornstein and Hunkins (2004:321) "good curriculum development is a cooperative venture". The dental school as a form of health sciences institution is supposed to be a learning organization that is constantly adapting to change, similarly teachers as custodians of the curriculum are supposed to have an understanding of the epistemological framework of the curriculum and its associated pedagogic practice.

Features common to many of the new curricula initiatives have included a decrease in the amount of factual knowledge presented, the fostering of adult learning styles, the provision of opportunities for student choices and the early introduction of clinical experience. Simultaneously several pedagogic trends

have emerged which together mark a shift in undergraduate education from an emphasis on teaching to one of learning. Among such emerging trends in undergraduate health sciences education are a focus on problems rather than disciplines, an emphasis on collaborative rather than individual learning, the use of communication and information technology to encourage self-directed learning, service learning as a means of strengthening learning, and best evidence medical education to validate and justify one's teaching approach. At the same time a variety of educational strategies appropriate for adult learning would need to be adopted by health sciences institutions in place of the traditional "spoon-feeding", these would be amongst others, self-directed learning, problem-based learning, integrated learning and task-based learning. However, facilitating student learning in these ways may prove more difficult than traditional teaching and, in addition, may possibly have considerable implications for staffing and other resources. Although methods of changing the style of teaching are becoming better known among teachers in health sciences institutions, not all have found general acceptance. Unfamiliarity with new techniques and mistrust of change often "conspire to slow down implementation" (Dent and Harden, 2001:5).

The literature reviewed seems to indicate a shift in emphasis from teaching to learning in health sciences education. The themes or dimensions reviewed underpin this apparent shift and were used as a basis to construct the research instrument (a self-administered questionnaire) to achieve the purpose and objectives of the study. These themes or dimensions are education for capability, community orientation in health sciences education and service-learning, self-directed learning, integration and early clinical contact, evidence-based health sciences education and communication and information technology. These themes, it would appear from the literature reviewed, emerge as having had a significant influence on curriculum change in health sciences education.

RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter provided the theoretical foundation of the study in various respects as indicated. This chapter introduces the methodology used to carry out the empirical part of the research. The research design as well as discussion about the questionnaire or measuring instrument are presented. The procedure or methods used to collect data are explained.

3.2 Research design

This study is essentially underpinned by the principles of quantitative research. Its research paradigm is prominently located within a positivist perspective where reality is objective and singular, separate from the researcher. Similarly, the researcher has an independent stance from that which is being researched in an unbiased and value-free way. The study is essentially a descriptive cross-sectional study.

The study was conducted by using a survey method. A survey method was selected because it is one of the better methods to assess perceptions and whereby information is collected from people about their feelings, beliefs, opinions, attitudes, perceptions etc. through questionnaires and interviews (Lemon, 1973:55).

According to Leedy (1997:91) "a questionnaire is one of the best tools to probe data beyond the physical reach of the observer. It is a totally impersonal probe, which is often self-administered and completed relatively anonymously and privately. It is able to provide data which lies buried deep within the minds, attitudes, feelings or reactions of respondents".

The advantages of using the survey method for the present study were as follows:

- Of the 220 questionnaires distributed, a large (168) population of dental educators was reached, thus increasing the generalizability of the data, sometimes referred to as external validity.
- Respondents tended to be more open and honest because they responded anonymously.

Hernerson, Morris and Fitz-Gibbon (1978:27) also stated that if properly conducted, the results of questionnaires could be reliable, representative of a much wider population and with the personal influence of the researcher on the results minimal.

The limitation of the survey method used in this case was that there were no face-to-face interviews to try and elicit more in-depth responses, mainly because the study wanted to establish baseline numerical information which could later be followed with text information which would elicit the “voice of the participants” in more detail (Creswell, 2003:17).

3.3 Study population

The study population comprised both full-time and part-time educators in South African dental schools. Information on all full-time and part-time staff for each dental school was collected via the office of the dean.

A total number of 220 questionnaires were distributed. Of these, 168 were returned and found suitable for use. The response rate was 76%. The response rate was above the normal pattern for self-administered questionnaires. This assisted the external validity and generalizability of the study. The intention was to cover all dental educators within South African dental schools at the time the study was undertaken.

3.4 Measuring instrument: questionnaire

A questionnaire was compiled and used to collect data. A copy of the questionnaire is presented as Annexure C. It was divided into two sections and covered the following information:

3.4.1 Section A

This section of the questionnaire consisted of nine items covering the respondents' demographic and biographical data such as gender, attachment to a specific university, full-time or part-time, rank within the profession, number of years in academic dentistry, age cohort, category of the courses or modules taught and whether they were members of the curriculum development committee. The above-mentioned data sets were deemed important to generate because they are considered as variables that would directly or indirectly influence perceptions of respondents towards curriculum change.

3.4.2 Section B

This section of the questionnaire consisted of 25 items broadly covering the following:

3.4.2.1 Curriculum organization and practice

Communication skills, attitudinal and ethical issues, preparation for practice, teamwork, and evidence-based practice have all found a place in revised curricula within health care sciences. Furthermore, courses emphasising self-directed learning, problem-solving and the development of critical thought serve students better than courses that demand only passive learning and factual recall (Biggs, 2003; Lockett, 2001; Harden, 2000; Masella, 2005).

Examples of different curricular models which may coexist include:

- outcome-based education (Harden et al. 1999)
- problem-based learning (Harden and Davis, 1998)
- task-based learning (Harden and Crosby, 2000)
- core and student-selected components (Harden and Davis, 1995)
- an integrated systems-based approach (Harden, 2000)
- a spiral curriculum (Harden et al. 1997).

The curriculum philosophy chosen by the school must have ownership by all stakeholders including teachers. All dental schools in South Africa have reviewed their curricula as a result of the higher education legislative framework. Most of the current teachers or lecturers are products of the traditional curriculum, and it is not known how they experience curricular changes that may contest their established pedagogical views (McAuley and Woodward, 1984; Vernon, 1995).

3.4.2.2 Education for capability

Recently, interest in health sciences education has focused on teachers or lecturers and the quality of the educational experience they offer students (Hesketh et al. 2001). The reason for this interest was that it was realised that in health sciences education that in most cases those involved in education and training activities have little or no formal training as educators (Carrotte, 1994). Furthermore, education for capability is also dependent on the educational skills of the teacher or lecturer particularly in a clinical setting in order to highlight competency (Rees, 2004).

The three circle framework referred to by Harden et al. (1999) elaborates on the work by Squires (1999) who analysed the teaching (lecturing) profession by reflecting on three questions viz. **what do teachers do?** i.e. the tasks that the teacher (lecturer) is able to do. Hesketh et al. (2001) has identified several task orientated competencies viz. teaching in large and small groups; teaching in a clinical setting; planning and facilitating and managing learning.

The second question is **how do they (teachers) do it?** The important outcomes in this category are those that encompass the “intellectual, emotional and creative intelligences” (Harden et al. 1999:12) viz:

- be familiar with, and have sufficient understanding of the various approaches to education which can inform their teaching (Simpson, 2007).
- have an understanding of the educational concepts used in their organization viz. the dental school in which they are employed as teachers/lecturers (Masella, 2005; Licari, 2007).
- showing enthusiasm for teaching and learning and innovation in curriculum development (Harden and Crosby, 2000).
- using evidence-based medical education as a basis for their decisions on which teaching and learning strategy to adopt (Belfield et al. 2001).

The third and final question is **what affects what they do?** viz. professionalism and self-development as a teacher.

- being seen to recognize the importance of teaching along with other commitments (Harden and Crosby, 2000).
- making a commitment for being a life-long learner with regard to teaching (Licari, 2007; Crawford et al. 2007).

As indicated previously in the literature review, implicit in education for capability is that medical and dental schools should have good teachers or lecturers capable of teaching within the above mentioned competency-based educational framework (Licari, 2007).

3.4.2.3 Community orientation and service-learning

Service-learning is one of several trends in pedagogy that together mark a shift in undergraduate education from an emphasis on teaching to one on learning (Seifer, 1998; Eyer and Giles, 1999). Among the other trends are a focus on problems rather than disciplines (Biggs, 2003), and emphasis on collaborative rather than individual learning (Ramsden, 2003), the use of integrative technology (Dalgarno, 2001), and careful articulation of learning outcomes coupled with assessment of learning success. (Harden and Stamper, 1999).

Furthermore, service-learning can enhance interpersonal skills that are key in most careers including dentistry such as careful listening, consensus building, and leadership (Hendricson and Cohen, 1998).

Among the frequently cited benefits of service-learning to student participants are the following:

- developing the habit of critical reflection (Schön, 1987);
- deepening the student's comprehension of the course content (Seifer, 1998);
- integrating theory with practice (Schmidt, 1998);
- increasing the student's understanding of the issues underlying social problems (Eyler and Giles, 1999);
- strengthening the student's sense of social responsibility (Lautar and Miller, 2007);
- enhancing the student's cognitive, personal and spiritual development (Eyler and Giles, 1999); and
- sharpening the student's abilities to solve problems creatively and to work collaboratively (Seifer, 1998; Yoder, 2006).

Also of importance is that, as a form of experiential education, service-learning is based on the pedagogical principle that learning and development do not necessarily occur as a result of experience itself, but as a result of a reflective component explicitly designed to foster learning and development (Piaget and Inhelder, 1987; Dewey, 1963; Schön 1987).

Teachers (lecturers) within a modern dental school must be familiar with these concepts and have the capability to facilitate and implement them.

3.4.2.4 Self-directed learning / learner-centred learning

According to one of the key principles of adult learning, adults have a deep need to be self-directing (Knowles, Holton and Swanson, 1998). It would seem that in most South African dental school curricula students are not actively engaged in the learning process. This is in line with traditional dental school curricula which are predominantly teacher-centred (Kassenbaum et

al. 2004). If teachers or lecturers have to successfully assist the shift in paradigm from teaching to learning, they have to be aware of the following educational principles:

- students must learn or be assisted to be self-directed and to manage their learning effectively (Ericsson et al. 1993);
- students have to be aware of how they learn best and have to develop strategies to balance competing demands on their learning (Crawford et al. 2007);
- students have to monitor information for meaning in the context of their learning (Lonka and Ahola, 1995); and
- students have to be able to evaluate their own performance against established norms (Entwistle and Ramsden, 1983; Biggs, 1993).

The above-mentioned skills are examples of metacognition or learning to learn, which teachers or lecturers at any dental school must know and be aware of if there is going to be a shift of emphasis from teaching to learning. In addition, teachers or lecturers must have the skills to facilitate active rather than passive learning eg. facilitating small group activities (Lonka, 1997). According to Chickering and Ehrmann (1996:5) “good learning is collaborative and social, not competitive and isolated”.

3.4.2.5 Problem-based learning (PBL)

According to Davis and Harden (1999) PBL if properly used, can result in several advantages for any teaching programme:

- relevance of curriculum content (Fish and Coles, 2005);
- elimination of irrelevant teaching material which tends to overload undergraduate training programmes (Bertolami, 2001);
- assists in identification of the core curriculum (Oliver et al. 2008);
- contributes to the acquisition of generic competencies (Fraser and Greenhalgh, 2001);
- student-centred and prepares for life-long learning (Pyle and Goldberg, 2006);

- assists in the process of integration (Harden, Davis and Crosby, 1997)
- frees students from rote learning and encourages deep learning (Davis and Harden, 1999).

Despite the above-mentioned advantages, PBL requires competencies many teachers do not apparently possess (Irby and Wilkerson, 2003). Teachers in medicine and dentistry teach as they themselves were taught using predominantly traditional approaches (Irby, 1996).

It is also apparent that in many dental schools the scholarship of teaching does not enjoy as much support and encouragement from the university (Mennin, 2005).

3.4.2.6 Integration and early clinical contact

Early clinical contact with patients is encouraged in most dental school curricula. This early clinical contact also encourages the incorporation of basic sciences throughout the undergraduate programme. This concept has been referred to as vertical integration (Snyman and Kroon, 2005). Vertical integration can also mean that a topic is revisited throughout the duration with further information being added year by year, a process termed concentric learning (Oliver et al. 2008).

On the contrary, horizontal integration implies that a topic is taught by different groups of staff from different departments by themes, sometimes referred to as thematic teaching (Grundy, 1994; Prideaux, 2005). A combination of vertical and horizontal integration has been described as a spiral curriculum (Harden and Stamper, 1999).

The dental education reform agenda argues for a learning environment that encourages students to learn collaboratively, provides students with opportunities early in the curriculum to practice the application of newly acquired biomedical information by solving patient problems, and consistently provides students with continuous contact with patients and their health problems throughout the educational programme (Hendricson and Cohen, 2001). To what extent are the current teachers or lecturers familiar with these concepts and what is their perception of these issues?

3.4.2.7 Evidence-based health sciences education

Many teachers or lecturers in dental schools do not have additional qualifications in tertiary education and yet education is an important component of the core-business (Mennin, 2005). There are usually tensions as to what is taught and how it is taught and as a result curriculum development processes are bound to be an area of conflict (Masella, 2005). In health sciences education, change is a constant (Pyle and Goldberg, 2008). Furthermore, it has been argued that new approaches may be introduced in dental education with much rhetoric but with little real, reliable or valid evidence (Davies, 1999; Biesta, 2007; Masella, 2005).

It is therefore important for us as teachers to think more critically about current educational practice and about new approaches to dental education.

3.4.2.8 Communication and information technology

Communication and information technology should be used by teachers or lecturers in dental education to enrich instructional interaction, allow flexibility of structures, and support individual learning paths, enable reflection, self- and peer assessment, promote the development of life-long learning attitudes, encourage active learning, collaborative and peer learning, support face-to-face teaching through blended learning environments (Mattheos et al., 2008).

It is important to realize that there are dental educators who desire change and those who fear change – especially that most of the current teachers in health sciences faculties are essentially products of the traditional curriculum (Masella, 2005). Therefore, it is important as part of base-line information to assess the perceptions of teachers in this regard.

The above-mentioned themes provided a framework for curriculum innovation and change, as a result were used as “dimensions” or categories to evaluate perceptions for or against change. The questions were meant to probe the respondents’ response on a five point ordinal Likert scale that

varies from 'strongly disagree'(1) to 'strongly agree' (5). The above-mentioned themes were used to assess the educators' perceptions and/or orientation to modern pedagogic practices in dental education.

3.5 Research procedure

3.5.1 Pilot study

A pilot study was conducted by distributing the questionnaire to twenty dental educators of various ranks within academic dentistry to comment on the format, content, readability and length of time to complete the questionnaire. The questionnaire was rephrased where necessary for purposes of clarity. The time taken to complete the questionnaire was found acceptable by all participants in the pilot study.

3.5.2 Data collection

Letters regarding permission to conduct the study were sent to all the deans of the schools of dentistry (Annexure A). Each questionnaire had a covering letter emphasizing anonymity and explaining the purpose of the research, as well as encouraging respondents to complete the questionnaire (Annexure B). The study was conducted between May 2007 and November 2007. Each dental school was assigned a person the researcher could communicate with directly regarding logistics of the study.

Questionnaires were distributed personally by the researcher for the schools in the Gauteng province and for the Western Cape and KwaZulu Natal schools, the questionnaires were sent by registered post.

3.6 Ethical considerations

According to Mouton (1996), the ultimate goal of all science is the search for truth which he refers to as the epistemic imperative. The “epistemic imperative” refers to the moral commitment that scientists are required to make to the search for truth and knowledge. The idea of an imperative implies that a moral contract has been entered into. This contract is neither optional nor negotiable but intrinsic to all scientific inquiry. Membership of the global scientific community implies commitment to the search for truth.

Therefore, the ethical considerations for this study were the following:

- Completion of the questionnaire by all educators was voluntary;
- All volunteers to the research were informed of all aspects of the research that might influence their willingness to participate;
- Full disclosure of the purpose of the research was done via a covering letter attached to the questionnaire (Annexure B);
- Confidentiality was ensured by making sure that the data collected cannot be linked to the individual by name.

Each questionnaire had a coding area which identified the dental school, without identifying the individual respondent (Annexure C).

3.7 Statistical analysis

3.7.1 Overview of statistical analysis procedures

The data was processed utilizing responses and coding them into a computerized dataset. It was coded, edited, checked before manipulation through the procedures provided by the Statistical Analysis System (SAS) in order to work out the various calculations relevant to the study. The SAS FREQ procedure was used to calculate the descriptive statistics needed. Descriptive statistics were used in this study to enable the researcher to extract essential information from numerical data and to determine its significance to the problem being investigated. Where necessary, statistical tests were undertaken to check for any statistical significance.

3.8 Conclusion

In this chapter a description of the research design and the procedures followed in conducting the empirical part of the study was presented. The results of this survey are presented in the next chapter.

RESEARCH RESULTS

4.1 Introduction

In chapter 3 the method used and procedures followed to generate data was described. In this chapter the results of the research are presented in the form of descriptive statistics in tabular form. The interpretation, discussion and integration of the findings are presented in the next chapter.

4.2 Results and discussions

The results of the study were analyzed with the aid of a computer by a statistician using frequency distributions and SAS FREQ techniques. The results are presented according to Sections A and B of the questionnaire (Annexure C).

4.2.1 Section A: Demographic and biographical information

The responses concerning demographic and biographical variables were dealt with in Section A of the questionnaire. As indicated in chapter 3, of the 220 questionnaires distributed (which represented the total study population of both full-time and part-time academic staff in the five South African dental schools), 168 questionnaires were returned, yielding a response rate of 76%. Section A of the questionnaire provided demographic and biographical information regarding the respondents. This information was used to analyze the characteristics of the study population at the time of the study. These results are presented in table form.

4.2.1.1 Gender

The gender composition of the respondents is shown in Table 4.1.

TABLE 4.1 RESPONDENTS BY GENDER (n=168)

Gender	Frequency	%
Males	98	58.3
Females	70	41.7
TOTALS	168	100

Table 4.1 indicates that 58.3% of the study population was comprised of males and 41.7% females. Academic dentistry over the years has always been dominated by male lecturers or teachers. This therefore implies that the gender distribution is within the expected norm.

4.2.1.2 University (dental school)

TABLE 4.2 RESPONDENTS BY UNIVERSITY (n = 168)

University	Frequency	%
Limpopo	68	40,5
Pretoria	46	27,4
Witwatersrand	15	8,9
Western Cape	21	12,5
KwaZulu Natal	18	10,7
TOTALS	168	100

The highest number of responses (40,5%) were from the University of Limpopo dental school and the lowest (8,9%) from the University of the Witwatersrand. The dental school associated with the University of Limpopo trains dental therapists in addition to dentists and oral hygienists and as a result has a higher staff component.

4.2.1.3 Full-time/Part-time

The distribution of the respondents by their full-time or part-time status is shown in Table 4.3.

TABLE 4.3 RESPONDENTS BY FULL-TIME/PART-TIME (n=168)

Full-time/Part-time staff	Frequency	%
Full-time	125	74,4
Part-time	43	25,6
TOTALS	168	100

Close to three quarters (74,4%) of the study population was employed full-time and with the balance (25,6%) part-time. The full-time staff component in all dental schools is more stable in terms of tenure compared to part-time staff who have a relatively high turnover.

4.2.1.4 Professional rank

The distribution of respondents by their professional rank is shown in Table 4.4.

TABLE 4.4 RESPONDENTS BY PROFESSIONAL RANK (n = 162)

Professional rank	Frequency	%
Specialist	57	35,2
Stomatologist	20	12,3
Dentist	71	43,9
Dental therapist	8	4,9
Oral hygienist	6	3,7
TOTALS	162	100

Frequency missing = 6

The highest number of respondents (43,9%) were dentists, followed by specialists with post-graduate qualifications (35,2%). The lowest number were oral hygienists (3,74%). Stomatologists are non-specialists with post-graduate qualifications. The organizational structure of dental schools is specialist driven, hence, just over a third of the respondents are registered specialists with the Health Professions Council of South Africa (HPCSA). It is unlikely that the variance by professional rank will have a direct effect on

the objectives of this survey. The variation by professional rank is more related to clinical competency.

4.2.1.5 Number of years in academic dentistry

The distribution of respondents by number of years in academic dentistry is shown in Table 4.5.

TABLE 4.5 RESPONDENTS BY NUMBER OF YEARS IN ACADEMIC DENTISTRY (n=168)

Number of years	Frequency	%
< 5 years	54	32,1
5 - 10 years	46	27,4
11 - 15 years	16	9,5
16 – 20 years	13	7,8
21 – 25 years	10	5,9
26 – 30 years	12	7,1
> 30 years	17	10,1
TOTALS	168	100

More than half (59,5%) of the respondents have less than ten years experience in academic dentistry and 10,1% have more than thirty years experience. The respondents with less than ten years experience in academic dentistry are more amenable to change and innovation than those for example with thirty years experience who are set in their way of teaching.

4.2.1.6 Academic rank

The distribution of respondents by academic rank is shown in Table 4.6.

TABLE 4.6 RESPONDENTS BY ACADEMIC RANK (n=164)

Academic rank	Frequency	%
Professor	29	17,7
Associate Professor	8	4,9
Senior lecturer	39	23,8
Lecturer	54	32,9
Other e.g. Registrars, dental technologists	34	20,7
TOTALS	164	100

Frequency missing = 4

53,6% of the study population are employed at an academic rank less than that of senior lecturer and a total of 22,6% are appointed at professorial level.

The individuals employed at an academic rank of professor in most cases are people who should provide academic leadership in terms of the core business viz. teaching, service, research and community engagement. It is also expected of them to provide leadership in curriculum innovation.

4.2.1.7 Age cohort

The distribution of respondents by age cohort is shown in Table 4.7.

TABLE 4.7 RESPONDENTS BY AGE COHORT (n=168)

Age cohort	Frequency	%
< 30 years	28	16,7
31 – 35 years	24	14,3
36 – 40 years	18	10,7
41 – 45 years	27	16,0
46 – 50 years	18	10,7
51 – 55 years	19	11,3
56 – 60 years	10	6,0
61 – 65 years	10	6,0
> 65 years	14	8,3
TOTALS	164	100

31% of the respondents are less than 35 years of age. 37,4% of the study population are within the age group 36 – 50 years and 41,6% are 51 years and above. The tendency is that the older the individuals are, the more resistant to change they become.

4.2.1.8 Courses or modules taught

The distribution of respondents by courses or modules taught is shown in Table 4.8.

TABLE 4.8 RESPONDENTS BY COURSES OR MODULES TAUGHT (n=165)

Courses or Modules taught	Frequency	%
Clinical	125	75,7
Biomedical Science	7	4,2
Pre-clinical	11	6,7
Public Health	14	8,5
Behavioural Sciences	2	1,2
Other	6	3,7
TOTALS	165	100

Frequency missing = 3

75,7% of the educators teach courses or modules in the clinical sciences category, the balance of 24,3% is spread between biomedical sciences, pre-clinical courses/modules, public health, behavioural sciences and other modules or courses. Around $\frac{3}{4}$ of the educators are involved directly or indirectly with the clinical competency of the students and as a result might wish to teach more in themes (thematic teaching) rather than in silos.

4.2.1.9 Membership of curriculum development committee

The distribution of respondents by their membership to the curriculum development committee is shown in Table 4.9.

TABLE 4.9 DISTRIBUTION BY MEMBERSHIP OF CURRICULUM DEVELOPMENT COMMITTEE (n=142)

Committee	Frequency	%
Yes	65	45,8
No	77	54,2

Frequency missing = 26

45,8% of educators indicated that they are part of the school's curriculum committee and 54,2% not. Membership to the curriculum development committee influences perceptions to curriculum innovation and change. With 54.2% not being members of the curriculum development committee there is a possibility that most educators will not be familiar with current educational theories.

4.2.2 Section B: Perceptions of educators towards curriculum change or innovation in health sciences education

One hundred and sixty eight (168) respondents answered the set of twenty five (25) questions which probed the educators' perceptions towards curriculum change or innovation in health sciences education. The responses are clustered into eight dimensions or categories, viz:

- curriculum organization
- education for capability
- community orientation
- self-directed learning
- problem-based learning
- evidence-based health sciences education
- communication and information technology
- service learning.

Table 4.10 provides an overview of the results obtained from these questions.

TABLE 4.10 CURRICULUM ORGANIZATION (n = 168)

Statements	Fre- quency missing	Strongly disagree / disagree		Strongly agree / agree		Not sure	
		n	%	n	%	n	%
The current curriculum in my dental school is a product of consensus among staff members and students	3	49	29,7	60	36,4	56	33,9
It is of no importance to integrate basic sciences with medical and dental clinical sciences	1	12	7,2	150	89,8	5	2,9
Early clinical contact with patients by our students has no benefit to them	1	17	10,2	138	82,6	12	7,2
Establishing a core curriculum will not assist in controlling information overload	1	21	12,6	106	63,5	40	23,9
Being a product of the traditional curriculum I have difficulty in adapting to a different curriculum	-	32	19,0	115	68,4	21	12,5
The pleasure and fulfillment of imparting knowledge to students can contribute to resistance to curriculum change	19	64	42,9	52	34,9	33	22,1
Teacher-centred delivery of a curriculum ensures preservation of departmental structures	2	42	25,3	95	57,2	29	17,5
An integrated curriculum model undermines departmental borders	18	78	52,0	46	30,7	26	17,3
A good teacher is one who effectively conveys knowledge to students	2	27	16,3	131	78,9	8	4,8
Good teaching promotes discovery and construction of knowledge by students	1	3	1,8	155	92,8	9	5,4
My students prefer lectures to interactive classes	1	67	40,1	49	29,3	51	30,5
Teaching in my opinion is not a form of scholarship, I would rather spend more of my time doing research	1	25	14,9	126	75,4	16	9,6
It is important that student assessment procedures reflect the learning outcomes	-	3	1,8	161	95,8	4	2,4

TABLE 4.11 EDUCATION FOR CAPABILITY (n = 168)

Statements	Fre- quency Missing	Strongly disagree / disagree		Strongly agree / agree		Not sure	
		n	%	n	%	n	%
The learning culture in my dental school is on transferring technological skills to students	1	49	29,3	80	47,9	38	22,7
The learning culture in my dental school engages and challenges students to critically integrate biomedical sciences into clinical dentistry	-	42	25,0	86	51,2	40	23,8

TABLE 4.12 COMMUNITY ORIENTATION (n = 168)

Statements	Fre- quency missing	Strongly disagree / disagree		Strongly agree / agree		Not sure	
		N	%	n	%	n	%
Connecting academic work with community service through structured reflection is beneficial to our students	-	12	7,1	144	85,7	12	7,1

TABLE 4.13 SELF-DIRECTED LEARNING (n = 168)

Statements	Fre- quency missing	Strongly disagree / disagree		Strongly agree / agree		Not sure	
		N	%	n	%	n	%
Active learning techniques cannot be used among large numbers of students	1	65	38,9	7,1	42,5	31	18,6
My role as a lecturer is to facilitate the process of learning rather than teach	1	32	19,2	125	74,9	10	5,9

TABLE 4.14 PROBLEM-BASED LEARNING (n = 168)

Statements	Fre- quency missing	Strongly disagree / disagree		Strongly agree / agree		Not sure	
		n	%	n	%	n	%
Problem-based learning (PBL) is not an important educational strategy for integrating the various components of a curriculum	1	23	13,8	120	71,9	24	14,4
There is no difference in outcomes between the traditional approach to teaching (i.e. lectures) and PBL	-	25	14,9	104	61,9	39	23,2

TABLE 4.15 EVIDENCE-BASED HEALTH SCIENCES EDUCATION (n = 168)

Statements	Fre- quency missing	Strongly disagree / disagree		Strongly agree / agree		Not sure	
		n	%	n	%	n	%
The curriculum change that has occurred in our faculty/school is a result of evidence gathered from educational research in the literature	-	18	10,7	73	43,4	77	45,8
The curriculum change that has occurred in our faculty/school is opinion-based rather than evidence-based	-	57	33,9	36	21,4	75	44,6

TABLE 4.16 COMMUNICATION AND INFORMATION TECHNOLOGY (n = 168)

Statements	Fre- quency missing	Strongly disagree / disagree		Strongly agree / agree		Not sure	
		n	%	n	%	n	%
Communication and information technology should be used as a resource for encouraging self-directed learning	-	6	3,6	157	93,4	5	2,9

TABLE 4.17 SERVICE LEARNING (n = 168)

Statements	Fre- quency missing	Strongly disagree / disagree		Strongly agree / agree		Not sure	
		n	%	n	%	n	%
Service learning must be integrated into the curriculum with time for student reflection on their expertise	3	8	4,8	141	85,4	16	9,7
Service-learning is an important form of pedagogy in dental education	1	9	5,4	125	74,8	33	19,8

4.2.3 Summary of perceptions of educators by demographic and or biographical variables

The focus of this summary will be on educators who were agreeable with the statements in the questionnaire. The summary will use the numerical coding rather than the wording viz.

- 1 = strongly agree
- 2 = agree
- 3 = not sure
- 4 = disagree
- 5 = strongly disagree as in the questionnaire

The difference in the numbers of questions per category was taken into account in the calculations of the percentages. Furthermore, Fisher's exact test was used because it is a test for comparison of two proportions (percentages), particularly when the sample sizes are small as was the case in this study.

TABLE 4.18 SUMMARY OF RESPONSES TO THE EIGHT CATEGORIES

Category(Number of questions)	% Response in category		
	4 + 5	3	1 + 2
Curriculum organization (13)	65	14	21
Education for capability (2)	50	23	27
Community orientation (1)	86	7	7
Self-directed learning (2)	59	12	29
Problem-based learning (2)	67	19	14
Evidence based health science education (2)	33	45	22
Communication and information technology (1)	93	3	4
Service-learning (2)	80	15	5

TABLE 4.19 SUMMARY OF RESPONSES IN GROUPS 4 + 5 BY GENDER (n = 168)

Category (Number of questions)	% Response in groups 4 + 5	
	Males (n = 98)	Females (n = 70)
Curriculum organizations (13)	65	65
Education for capability (2)	48	51
Community orientation (1)	82	91
Self-directed learning (2)	56	63
Problem-based learning (2)	61	75
Evidence based health science education (2)	35	29
Communication and information technology (1)	94	93
Service-learning (2)	79	82

Within the category of curriculum organization there was an equal distribution of responses by gender, with the rest of the distributions almost equal except for problem-based learning where females were higher than the males.

TABLE 4.20 SUMMARY OF RESPONSES IN GROUPS 4 + 5 BY UNIVERSITY (n = 68)

Category (number of questions)	% Responses in groups 4 + 5				
	Limpopo (n=168)	Pretoria (n=46)	Wits (n=15)	W. Cape (n=21)	KZN (n=18)
Curriculum organization (13)	65	63	68	66	66
Education for capability (2)	47	47	57	45	64
Community orientation (1)	87	80	93	86	89
Self-directed learning (2)	53	52	73	79	61
Problem-based learning (2)	75	61	52	69	61
Evidence based health science education (2)	29	36	50	33	22
Communication and information technology (1)	96	91	93	95	89
Service-learning (2)	75	77	100	80	89

There was variation in the percentage of agreeable responses within each category by university (dental school).

TABLE 4.21 SUMMARY OF RESPONSES IN GROUPS 4 + 5 BY FULL-TIME / PART-TIME (n = 168)

Category (Number of questions)	% Response in groups 4 + 5	
	Full-time (n = 125)	Part-time (n = 43)
Curriculum organizations (13)	65	63
Education for capability (2)	49	51
Community orientation (1)	86	84
Self-directed learning (2)	59	58
Problem-based learning (2)	68	63
Evidence based health science education (2)	33	30
Communication and information technology (1)	94	93
Service-learning (2)	82	75

The responses were almost similar for both full-time and part-time educators.

TABLE 4.22 SUMMARY OF RESPONSES IN GROUPS 4 + 5 BY RANK (n = 168)

Category (number of questions)	% Responses in groups 4 + 5				
	Professor (n=29)	Ass Prof (n=8)	Snr Lect (n=39)	Lecturer (n=54)	Other (n=39)
Curriculum organizations (13)	70	65	62	65	63
Education for capability (2)	50	44	39	52	56
Community orientation (1)	76	88	90	83	94
Self-directed learning (2)	65	69	55	58	55
Problem-based learning (2)	66	69	68	70	65
Evidence based health science education (2)	48	44	32	25	31
Communication and information technology (1)	97	88	97	91	91
Service-learning (2)	82	75	87	77	78

There was variation in the percentage of agreeable responses within each category by academic rank.

TABLE 4.23 SUMMARY OF RESPONSES IN GROUPS 4 + 5 BY YEARS IN ACADEMIC DENTISTRY (n = 168)

Category (number of questions)	% Responses in groups 4 + 5			P Value
	< 5 years (n = 54)	5 – 15 years (n = 62)	> 15 years (n = 52)	
Curriculum organizations (13)	64	64	52	-
Education for capability (2)	49	59	59	-
Community orientation (1)	93	85	79	0,122
Self-directed learning (2)	56	56	64	-
Problem-based learning (2)	71	68	61	0,241
Evidence based health science education (2)	23	31	44	0,004*
Communication and information technology (1)	93	92	96	-
Service-learning (2)	76	82	82	-

* Statistically significant (p<0,05)

Fisher's exact test was used for comparison of three percentages where there was a consistent upward or downward trend over the three groups of numbers of years in academic dentistry, as an indication of the significance of the trend.

TABLE 4.24 SUMMARY OF RESPONSES IN GROUPS 4 + 5 BY AGE COHORT (n = 168)

Category (number of questions)	% Responses in groups 4 + 5			P Value
	< 5 years (n = 54)	5 – 15 years (n = 62)	> 15 years (n = 52)	
Curriculum organizations (13)	64	63	68	-
Education for capability (2)	51	50	48	0,924
Community orientation (1)	94	84	79	0,066*
Self-directed learning (2)	53	60	63	0,367
Problem-based learning (2)	72	66	63	0,347
Evidence based health science education (2)	28	28	42	-
Communication and information technology (1)	94	92	94	-
Service-learning (2)	76	84	80	-

*Statistically significant at the 10% level using Fisher's exact test.

Similarly as in Table 4.23 Fisher's exact test was used for comparison of three percentages where there was a consistent upward or downward trend over the three age cohorts as an indication of the significance of the trend.

4.3 Conclusion

Table 4.10 Curricula organization

What seems to emerge from the responses is the following:

1. Just over a third (36,4%) of the respondents perceive the curriculum in their dental school as a product of consensus among staff and students. It is important to note that 33,9% of the respondents were not sure.
2. The majority of the respondents (89,8%) agree that there is no need for integration of basic sciences with medical and dental clinical sciences.

3. The majority of the respondents (82,6%) do not perceive early clinical contact as of benefit to the students.
4. The majority of the respondents (63,5%) do not perceive a core curriculum as important for controlling information overload.
5. The majority of the respondents (68,4%) agree with the statements that being a product of the traditional curriculum they have difficulty in adapting to a different curriculum.
6. The majority of the respondents (42,9%) disagree that imparting knowledge to students can contribute to resistance to curriculum change.
7. The majority of the respondents (57,2%) agree with the perception that teacher-centred delivery of a curriculum ensures preservation of departmental structures.
8. The majority of the respondents (52%) disagree with the perception that an integrated curriculum model undermines departmental borders.
9. The majority of the respondents (78,9%) agree with the perception that a good teacher is one who effectively conveys knowledge to students.
10. The majority of the respondents (92,9%) agree with the perception that good teaching promotes discovery and construction of knowledge by students.
11. The majority (40,1%) disagree with the perception that their students prefer lectures to interactive classes. However, it is important to note that 30,5% of the respondents were not sure.
12. The majority (75,4%) agree with the perception that teaching is not a form of scholarship, they would rather spend more of their time doing research.
13. An overwhelming majority (95,8%) agree with the perception that student assessment procedures must reflect the learning outcomes.

Table 4.11 Education for capability

What seems to emerge from the responses in this category of questions is the following:

1. The majority (47,9%) of the respondents have a perception that the learning culture within their dental school is on transferring technological skills to students.
2. The majority (51,2%) of the respondents have a perception that the learning within their dental school engages and challenges students to critically integrate biomedical sciences into clinical dentistry.

Table 4.12 Community orientation

1. The majority (85,7%) of the respondents are of the opinion that connecting academic work with community service through structured reflection is beneficial to students.

Table 4.13 Self-directed learning

1. The majority (42,5%) of the respondents are of the opinion that active learning techniques cannot be used among large numbers of students.
2. The majority (74,9%) of the respondents are of the opinion that their role is to facilitate the process of learning rather than teach.

Table 4.14 Problem-based learning

1. The majority of the respondents (71,9%) perceive PBL as not an important educational strategy for integrating the various components of a curriculum.
2. The majority of the respondents (61,9%) are of the opinion that there is no difference in outcomes between the traditional approach to teaching (i.e. lectures) and PBL.

Table 4.15 Evidence-based health sciences education

1. The majority of the respondents (45,8%) are not sure whether the curriculum change that has occurred in their faculty/school is as a result of evidence gathered from educational research in the literature.
2. The majority of the respondents (44,6%) are not sure whether the curriculum change that has occurred in their faculty/school is opinion-based rather than evidence-based.

Table 4.16 Communication and information technology

1. An overwhelming majority of the respondents (93,4%) perceive communication and information as a resource for encouraging self-directed learning.

Table 4.17 Service-learning

1. A significant majority (85,4%) of the respondents are of the opinion that service-learning must be integrated into the curriculum with time allowed for student reflection on their expertise.
2. The majority (74,8%) of the respondents are of the opinion that service-learning is an important form of pedagogy in dental education

Overall there was a variation of the educators' perceptions by demographic and or biographic variables, with the exception of curriculum organization where there was an equal distribution and PBL where females were higher than males (Table 4.19). Also of interest was an almost equal distribution of responses between full-time and part-time staff (Table 4.21).

In this chapter the results of the investigation were presented in line with the research methodology followed, the next chapter will interpret and discuss the results.

INTERPRETATION OF RESULTS AND DISCUSSION

5.1 Introduction

In the previous chapter the results of the study were reported. This chapter presents the interpretation and discussion thereof.

5.2 Perceptions of educators towards curriculum change or innovation in health sciences education

Section B of the questionnaire examined the perceptions of educators towards curriculum change or innovation in health sciences.

5.2.1 Curriculum organization

The results of this category are presented in Table 4.10.

5.2.1.1 The current curriculum in my dental school is a product of consensus among staff members and students

In order for a curriculum to be successful it must have ownership by all stakeholders within a dental school (Kassebaum et al. 2004). Only 36,4% of the study population agreed with this statement. It is also interesting to note that 33,9% of the educators were not sure whether such a process has taken place in their dental school while 29,7% of the educators disagreed with this statement.

Even though there was a marginal agreement to this statement (36,4%), it would appear that curriculum ownership by all stakeholders is not sufficiently emphasized in South African dental schools, especially in view that less than half (45,8%) of the study population belonged to a curriculum development committee within the school.

The question of perception of who should plan the curriculum can be a major source of conflict within a dental school. Traditionally, it has been assumed that subject specialists in the various fields of dentistry are the only people who can decide what should be taught within their discipline, as a result centralized curriculum planning can lead to disengagement of most educators who may feel that what they are being asked to teach conveys at best an inadequate, and at worst an inaccurate, picture of their discipline. It is important that both full-time and part-time teachers who are to deliver the curriculum, should feel that they have a stake in it (curriculum ownership). The curriculum should not be a product designed by “others” for implementation within the school without ownership by all the relevant stakeholders. The response to the above-mentioned statement seems to indicate that there is some consensus planning within dental schools which encourages a wider community of teachers to be involved in the process of curriculum development. Of particular concern is that just over a third (33,9%) of the educators were not sure whether their curriculum is a product of consensus among staff and students.

5.2.1.2 It is of no importance to integrate basic sciences with medical and dental clinical sciences

89,8% of the respondents agreed with the statement and 7,2% disagreed. This distribution of responses is an indication that most educators do not apply vertical integration in their courses or modules. Vertical integration implies that clinical methods and science are taught at the same time as the basic sciences. The commonest form of vertical integration involves the early introduction of clinical contact with patients in the course. As the course progresses, the amount of clinical contact increases and the amount of basic sciences is reduced. This has been described as an “inverted triangle” curriculum (Hendrickson and Cohen, 2001:1190). This perspective is in line with modern pedagogic practice in health sciences education. The traditional approach in health sciences education (Pyle et al; 2006) is to have the pre-clinical phase followed by the clinical phase of the curriculum with very little integration (Snymand and Kroon, 2005).

Most of the educators do not seem to agree with the pedagogic practice of vertical integration within the curriculum, which in itself indicates the lack of integration in the courses or modules taught.

5.2.1.3 Early clinical contact with patients by our students has no benefit to them

82,6% of the educators agreed with this statement and only 10,2% disagreed. This, therefore, implies that there is very little integration in most of the curricula in South African dental schools.

It is regarded as paradoxical by some health sciences educators that integrated curricula require a greater degree of structuring than those based around traditional disciplines. In a course based on separate disciplines, concepts and key ideas can be defined by the well-structured approaches existing in the disciplines. In an integrated curriculum, concepts and key ideas or themes from several disciplines must be combined together in some logical way. Hence there has been increasing interest in, for example, medical education on approaches to the organization and articulation of the curriculum and its content. Early clinical contact with patients by our students (even if they assist and observe what the more senior students are doing) can assist in the whole process of integrated learning.

The rationale for integrated learning can be found in some of the writings in clinical psychology. For example Regehr and Norman (1996) refer to the concept of “context specificity”. The ability to retrieve an item from memory depends on the similarity between the condition or context in which it was originally learned and the context in which it is retrieved. There are at least three ways to address context specificity:

- To promote the elaboration of knowledge in “richer” and “wider” contexts. Horizontally integrated systems or case-based curricula can provide such elaboration
- Repeated opportunities to use information in different contexts can also increase the effects of context specificity. Such opportunities can be found in vertically integrated courses where there is revisiting of

knowledge in different situations and in different combinations of disciplines.

- An additional way of increasing the effect of context is to take the learning contexts as close as possible to the context in which the information is to be retrieved. This provides an argument for integrated learning within integrated clinical contexts and justifies the rationale for early clinical contact by students.

Most of the educators do not perceive early clinical contact with patients as important and by implication the importance of context specificity in the teaching and training of dentists.

5.2.1.4 Establishing a core curriculum will not assist in controlling information overload

63,5% of the respondents agreed with the statement, and only 12,6% disagreed while 23,9% were not sure. With the exponential increase in biomedical knowledge, the emergence of new disciplines and subject areas, and a persisting and unrealistic drive for completeness, it was almost inevitable that basic medical and dental curricula should have become intolerably overloaded. As a result, information overload has been identified as the root cause of many of the curricular ills detrimental to student learning including:

- undue emphasis on the acquisition of factual knowledge at the expense of other key professional competencies;
- stifling of curiosity, enquiry, reasoning and the exploration of knowledge;
- poor preparation of graduates for modern practice and the next phase of the medical and dental educational continuum (Cholerton and Jordan, 2005:171).

The consequence of information overload is superficial learning (Biggs, 2003; Ramsden, 2003). However, the population of educators studied does not perceive a core curriculum to have any benefit to controlling information overload.

5.2.1.5 Being a product of the traditional curriculum I have difficulty in adapting to a different curriculum

68,4% of the respondents agreed with this statement and 19% disagreed, with 12,5% being not sure. Often educators in dental schools have not been able or willing to keep up with progressive educational developments, they have not stayed abreast of the knowledge explosion which would allow them to feel committed to curriculum change (Pyle and Goldberg, 2008). Curriculum issues are perceived as additional work on an already overloaded schedule (Hendricson et al, 2006). They view new curricular programmes as requiring them to learn new teaching skills, develop new competencies in curriculum development, acquire new skills in interpersonal relations and continuously reflect about their teaching (Ramsden, 2003). According to Lockett (2001) effective experiential learning often occurs in a pedagogical relationship of mentorship or mediation rather than the more traditional modes of tutelage or apprenticeship, and most educators have difficulty in adapting to this paradigm shift which requires new and different skills to the ones they have.

Cornbleth's (1990:6) perspective of a curriculum as "contextualized social practice" which in essence is the "on-going social process comprised of interactions of students, teachers, knowledge and milieu" is of relevance in this context. Within the context of the traditional curriculum the educator provides the unit outline which defines learning by the student. The student learns according to the unit outline. The teacher controls the content and directs student learning. They themselves (i.e. educators) are products of this "contextualized social practice" and as a result have difficulty in changing.

Lawrence Stenhouse (1976), one of the seminal writers on curriculum design and development, has distinguished between curriculum as "intention" and curriculum as "reality". There may well be a difference between the curriculum as it is intended by its designers and how it is received by the students who experience it. Thus the real measure of the degree of integration of a curriculum for example is not what is written down in plans, statements and booklets but rather how much integration takes place in student learning and how is it facilitated by the educators.

5.2.1.6 The pleasure and fulfillment of imparting knowledge to students can contribute to resistance to curriculum change

34,9% of the respondents agreed, 22,1% were not sure and 42,9% disagreed.

Teachers' conceptions of teaching have been reviewed by Kember (1997:256). Many teachers would argue that in teaching the main thing they are doing is "covering the subject"; others would claim that they are "imparting information", although some might go as far as claiming that they are "imparting knowledge". The emphasis is essentially on the content of the subject and their teaching of it. Such teaching could be classified as being teacher-centred and content-oriented. The teacher is the key person in the lecture and is primarily concerned with the transmission of information to the passive recipients, viz. the students.

On the other hand, there are other teachers who view teaching from a different perspective. Their conception of teaching is not about transmitting information or imparting knowledge, but about facilitating student learning. These teachers, according to Kember (1997), adopt an approach to teaching that is student-centred and learning oriented.

Within the context of a hybrid curriculum there is a proportion of formal lectures where knowledge is transmitted, and the other part is self-directed either via problem-based or case-based learning. 42.9% of the respondents who disagreed with the above-mentioned statement are in essence saying imparting knowledge to students does not contribute to resistance to curriculum change. The other group (34,9%) agreed with the statement.

According to Fraser and Bosanquet (2006) there are variations in teachers' conceptions of a curriculum. There are those who perceive the curriculum as teacher-directed with a product focus. The curriculum is a document of technical interest. The emphasis is on content. Then there are those who believe that the curriculum focus should be on process over content, framing the learning environment and encouraging reflective practice; to them a curriculum is a document of practical interest. Within the latter context the

student is encouraged to meaningfully engage with the knowledge of the discipline and communicate his or her interests. These are factors that can influence the teachers' outlook.

5.2.1.7 Teacher-centred delivery of a curriculum ensures preservation of departmental structures

57,2% of the respondents agreed, 25,3% disagreed, with 17,5% not sure.

There are various interpretations of a curriculum as “a prescribed course of study”. Some teachers use it in its widest sense to encompass all those processes that contribute to the student's learning experience, while others take a narrower view defining the curriculum largely in terms of the learning content. Most dental schools made little attempt to be more explicit in this regard, relying more on constituent subject groupings to define curriculum components. This inevitably resulted in what was perceived by discipline specialists as essential knowledge that is required within the discipline. Curriculum design as a result consisted of little more than rationing the available time and sharing it between the semi-autonomous discipline-based departments. Clearly therefore, within this context teacher-centred delivery of a curriculum ensures preservation of departmental structures.

According to Crain (2008) most dental schools in the United States of America have the following traditional structure and culture:

- strong tradition of departmental autonomy and faculty allegiance to disciplines rather than to the dental school as a whole;
- departmentalization that contributes to parochialism and resistance to change;
- lack of learning culture that values teaching excellence, evidence-based educational methodology, faculty scholarship and leadership;
- prevailing personality of dental faculty (conservative, cautious and risk averse).

It would appear that the South African counter-part is not much different because the organizational framework of South African dental schools is driven by departments. The majority of teachers within these departments believe it is their right to teach their own discipline (specialist driven). According to Harden (2000) this is no longer acceptable. The sciences underlying medicine and or dentistry should be taught by whoever is the most appropriate in the context of the students' learning, and indeed it may be that no one teaches much of it, but rather the students are stimulated and or facilitated to learn it themselves (Ramsden, 2003). The role of the teachers is then to prepare the relevant material (e.g. PBL cases) that will trigger the appropriate student learning, to provide a small number of overview and summary lectures and to participate in an expert forum (Harden and Crosby, 2000). An expert forum is where one or more experts in a particular topic stand in front of the students and simply answer questions that the students put to them rather than being constrained by their departments which may or may not necessarily be teacher-centred.

Teacher-centred delivery of a curriculum will ensure preservation of departmental structures if teachers or lecturers perceive the curriculum as a product rather than a process (Cornbleth, 1990). This therefore implies that most of the teachers or lecturers perceive the curriculum as a product rather than a process.

5.2.1.8 An integrated curriculum model undermines departmental borders

30,7% of the respondents agreed with this statement, 52% disagreed and 17,3% were not sure. The 52% of the respondents who disagree are in effect saying an integrated curriculum does not undermine departmental borders. In other words integration can occur within departmental borders.

It would appear that whatever the formal structure of the course, integration can only take place at the level of the students' experience of learning. Different approaches to achieving integration have been used with varying degrees of success within a departmentalized structure e.g. a 'Spiral curriculum' which uses themes as a way of providing both vertical and horizontal integration. (Harden and Stamper, 1999).

5.2.1.9 A good teacher is one who effectively conveys knowledge to students

78,9% of the respondents agreed and 16,3% disagreed with only 4,8% not sure.

The teacher-centred paradigm is obviously dominant among educators in South African dental schools. It appears to emphasize teaching rather than learning, as well as passive acquisition of information rather than active student learning that promotes development of critical thinking skills among students.

Furthermore, within the context of curriculum development one would assume that the curriculum is developed mainly by subject specialists and their assumptions of student needs. They would then “deliver” or “convey” the content to the students. The educator implements the curriculum and student learning is controlled, so that at the end of the teaching process students can be judged in terms of how well they have achieved the unit or programme goals. Content is a highly significant aspect of the curriculum, is selected by the teacher, and acts to both constrain curriculum change and determine which aspects are modified (Fraser and Bosanquet, 2006). The curriculum therefore is teacher-directed and has a product focus.

5.2.1.10 Good teaching promotes discovery and construction of knowledge by students

This perspective of teaching differs from the previous one in that it emphasizes learner-centredness. It is grounded in constructivism (Savery and Duffy, 1995). In constructivism, learning is at the centre and the learner must participate in generating meaning or understanding. From the literature reviewed there are three perspectives of constructivism viz:

- a) learners or students should be placed within the environment they are learning about and construct their own model, with only limited support provided by the teacher or facilitator (Norman and Schmidt, 1992; Schmidt, 1993). This is the perspective of the radical constructivists;

- b) moderate constructivists claim that formal instruction is still appropriate, but that students should then engage in relevant activities to allow them to apply and generalize the information and concepts provided in order to construct their own model of the knowledge (Perkins, 1991) and finally;
- c) construction occurs best within an environment that allows collaboration between learners or students, their peers, experts in the field and teachers (Regehr, Martin and Hutchinson, 1995).

Curriculum from a practical or communicative interest aims at reaching an understanding that enables appropriate action to be taken. The student and teacher interact to make meaning of the subject matter, thus equipping students to act on these meanings. This encourages what Lockett (2001) refers to as “personal competence”. According to Stenhouse (1975) curriculum development should be a process which “rests on teacher judgment, rather than teacher direction”. Newman and colleagues (1996) have provided a critique of constructivist approaches where student engagement has become an “end in itself” rather than the pursuit of quality learning and “intellectual” outcomes for students. They use the term “authentic learning” which they argue has three central components which are:

- Construction of knowledge
- Disciplined inquiry
- “value beyond” the school or educational context in which the learning takes place.

92,8% of the respondents agreed with the application of constructive pedagogy and only 1,8% disagreed, while 5,4% were not sure.

5.2.1.11 My students prefer lectures to interactive classes

29,3% of the respondents agreed and 40,1% disagreed while 30,5% were not sure. This therefore means that 40,1% of the teachers were of the opinion that their students prefer interactive classes than traditional lectures.

While there is debate over which learning methods are the most effective and efficient, there are some established principles that should be taken into account (Dent and Harden 2001). It is evident that knowledge is applied most effectively when it is learnt in the context in which it is applied (Schön, 1987). It is also accepted in the literature that active learning is more effective than passive learning (Schmidt, 1998). Therefore, despite the fact that the teacher-centred paradigm is dominant (78,9%) among South African teachers as previously indicated, it is, however, encouraging that approximately 40% of the teachers attempt and encourage active learning in the form of interactive classes.

Interactive classes by their very nature encourage deep learning rather than superficial learning which is usually associated with traditional didactic lectures. The educators must have skills in this type of interactive pedagogy. Teachers constantly reflect on their practice and constantly explore new practices (theory in practice) that encourage learning (Hesketh et al. 2001). Within this context the curriculum places emphasis on actions or practices which arise as a consequence of reflection. According to Stenhouse (1975:50) "it is not enough that teachers' work should be studied, they need to study themselves".

The choice of methods for a given curriculum will depend on a range of outcomes that have been chosen. It is important that the outcomes determine the methods and not the other way round. In general, the use of a mixture of methods is likely to be more efficient than a doctrinaire adherence to a single method.

5.2.1.12 Teaching in my opinion is not a form of scholarship, I would rather spend more of my time doing research

75,4% of the respondents agreed, 14,9% disagreed and 9,6% were not sure. To the majority of educators teaching is not a form of scholarship.

Standards may also be conceptualized in the form of competencies defined as outcomes expected of teachers and graduates (Harden et al., 1999). The theoretical basis of this perspective is covered in detail under “education for capability” in my review of the literature. Clear, well established rules, expectations and standards exist for the conduct of research and patient care in South African dental schools. Academic status within oral and dental hospitals which are closely linked to the dental schools is based on expertise and performance within a speciality. The ability to generate outside funding for research and/or clinical care confers influence and standing in academic circles within South African dental schools. The culture of research and patient care endeavours is highly developed and universally accepted. Not so for education. A double standard exists: One for research and patient care and another for education, even though all three constitute the core business of a dental school.

Unlike research and patient care activities, teachers of dental students rarely receive formal training or preparation in teaching, education or assessment of learners. Chairs of departments (who should be role models) and their staff often fail to distinguish between teaching as a scholarly activity and teaching as a routine service. Poor teaching performance is tolerated, whereas poor quality in research or substandard patient care is not.

While peer review is well established for research and patient care activities, it is as yet relatively underdeveloped in education at most dental schools. Teachers at dental schools are well aware that the rewards and recognition for research and patient care are substantive; those for teaching and education suffer by comparison. It is on this basis that the majority (75,4%) of educators in South African dental schools have a perception that teaching is not a form of scholarship, they would rather spend more of their time doing research.

5.2.1.13 It is important that student assessment procedures reflect the learning outcomes

95,8% of the respondents agreed and only 1,8% disagreed with 2,4% not sure.

In many instances teachers focus on what they teach rather than on what students learn. Outcome-based education emphasizes what we expect students to have achieved when they complete the course. In most areas these learning achievements go beyond knowing, rather, they describe what students can actually do with what they know (practical competence) (Hesketh et al. 2001).

Outcome-based education defines what is expected of our graduates and holds teachers accountable to providing an education that achieves the stated outcomes (Harden, Crosby and Davis, 1999). It is not only good education, it is good public policy. Most South African dental schools have outcome-based curricula and are expected by the Health Professions Council of South Africa to comply. It is therefore not surprising that almost all the educators are familiar with and agree (95,8%) with this statement.

5.2.2 Education for capability

The results of this category are presented in Table 4.11.

5.2.2.1 The learning culture in my dental school is on transferring technological skills to students

47,9% of the respondents agreed, 29,3% disagreed with 22,7% not sure.

Within the curriculum, learning by doing or practical competence is strongly emphasized. However, this emphasis is done by subject specialities rather than in an integrated format such as in task-based learning. The clinical phase of the curriculum is to ensure clinical competencies from all graduates (Hendricson and Kleiffner, 1998).

The learning culture of any dental school should not be driven by transferring technological skills to students only. Harden et al. (1999) speaks of “task-orientated or technical intelligences ” – the tasks the doctor is able to do, “intellectual, emotional and creative intelligences” – how the doctor approaches his/her teaching, “personal intelligences” refers to the doctor as a professional teacher. All these fundamental ingredients must constitute a learning culture. There appears to be a strong emphasis of transferring technological skills or technical intelligences to students.

5.2.2.2 The learning culture in my dental school engages and challenges students to critically integrate biomedical sciences into clinical dentistry

51,2% of the respondents agreed, 25% disagreed and 23,8% were not sure.

As previously indicated the emphasis of this question is on the “intellectual, emotional and creative intelligences” i.e. how the doctor approaches his/her teaching (Harden et al., 1999).

Within this context teachers see their role as using their judgment in interpreting the curriculum for their students, and making meaning of the unit or programme of study for them, in an environment based on open communication, trust and mutual respect. Students are themselves an important part of the curriculum. Grundy (1987) suggests that they are the subject of the curriculum, not its object. Learning, not teaching, is the central concern of the teacher. Context is selected for the purpose of assisting “meaning making and interpretation, and it is likely to be holistically oriented and integrated” (Grundy, 1987:25). It is of concern that only 51,2% of the respondents seem to agree with this pedagogic practice.

5.2.3 Community orientation

The results of this category are presented in Table 4.12.

5.2.3.1 Connecting academic work with community service through structured reflection is beneficial to our students

85,7% of the respondents agreed, 7,1% disagreed and 7,1% not sure.

Curricula with a community orientation encourage experiential learning by the students which in itself strengthens personal competence of the individual student as he/she learns by engaging personally and thinking reflexively about issues and or problems that are community-based (Lockett, 2001). The role of the educator in this context is to act as a mediator or facilitator of the structured reflection by our students. This can be done via reflective journals. The large proportion (85,7%) of respondents who agreed with this statement is encouraging because this type of pedagogy is grounded in experience as a basis for learning and on the centrality and intentionality of reflection designed to enable learning to occur. This perspective is based on the work of Dewey (1963) and Kolb's (1984) experiential learning.

5.2.4 Self-directed learning

The results of this category are presented in Table 4.13.

5.2.4.1 Active learning techniques cannot be used among large numbers of students

42,5% of the respondents agreed, 38,9% disagreed and 18,6% were not sure.

Cantillon (2003) has shown that students recall facts better once a lecturer allocates time within a lecture for student activity of any form. Therefore, various active learning techniques can be used to facilitate learning among large numbers of students. The larger proportion of teachers (42,5%) who agreed with this statement could be as a result of deeply ingrained instructional behaviours and personal philosophies about a teacher's roles and relationship with students (Crain, 2008).

5.2.4.2 My role as a lecturer is to facilitate the process of learning rather than teach

74,9% of the respondents agreed, 19,2% disagreed and 5,9% were not sure.

The implication of this data distribution seems to suggest that the student learning experience is central to the curriculum, and reflective practice is at the heart of their teaching. It also suggests that teachers reflect on their teaching, encourage student feedback in order to consolidate learning. This perspective is in line with the theories of Habermas (1971) and further supported by Fraser and Bosanquet (2006).

5.2.5 Problem-based learning

The results of this category are presented in Table 4.14.

5.2.5.1 Problem-based learning (PBL) is not an important educational strategy for integrating the various components of the curriculum

71,9% of the respondents agreed, 13,8% disagreed and 14,4% were not sure.

For over thirty years particularly in medical education evidence has accumulated to demonstrate that the method successfully encourages effective and self-directed learning, critical thinking, teamwork, understanding rather than memorization and facilitates usage of professional language by the students. It has also been found by Licari (2007) that PBL is not commonly used as a medium for integration in most dental schools in the United States of America. It would appear that most dental school educators in South Africa do not use PBL as a means to integrate the curriculum, despite its well known inclination for encouraging deep and lifelong learning.

5.2.5.2 There is no difference in outcomes between the traditional approach to teaching (i.e. lectures) and PBL

61,9% of the respondents agreed, 14,9% disagreed and 23,2% were not sure.

According to Newman et al. (1996) the central elements of the process of inquiry are:

- building on a prior knowledge base
- providing for in-depth learning and
- providing for elaborated learning

These notions match the central elements of problem-based learning. Thus problem or case-based learning will provide a strong foundation for authentic integrated learning. Furthermore, Barrows and Kelson (1995) define the goals of PBL as helping students develop effective problem-solving skills, develop self-directed lifelong learning skills, become effective collaborators and become intrinsically motivated to learn. Hmelo-Silver (2004) found some support that PBL is superior to traditional curricula.

The distribution of the data in response to this statement supports the fact that most educators in South African dental schools do not use PBL in their teaching and learning practice.

5.2.6 Evidence-based health sciences education

The results in this category are presented in Table 4.15.

5.2.6.1 The curriculum change that has occurred in our faculty/school is a result of evidence gathered from educational research in the literature

43,4% of the respondents agreed, 10,7% disagreed with 45,8% not sure.

The high proportion of respondents not being certain how to respond to this question is interesting. It could be associated with very little or no involvement of the respondents with the debates and discussions associated with curriculum development processes within the faculty or school. Furthermore, it could be in line with the fact that a significant proportion of respondents were not members of the curriculum development committee. According to Winning et al. (2008) the principles and processes of best-evidence medical education should be infused in a modern progressive curriculum. It should be patient-centred, learner-centred, active and

interactive, modelled as essential to becoming an expert clinician, match, and take advantage of the clinical setting and circumstances, well prepared and multi-staged. Only 43,4% of the respondents agreed that the curriculum change was associated with evidence from educational research. It could also be an indicator that educational research is not important.

5.2.6.2 The curriculum change that has occurred in our faculty/school is opinion-based rather than evidence-based

Only 21,4% of the respondents agreed, 33,9% disagreed and a significant proportion (44,6%) were not sure.

According to Sackett, Strauss, Richardson, Rosenberg and Haynes (2000) an evidence-based health care curriculum draws on social constructivist, cognitive and behavioural theories of learning which are in alignment with modern pedagogic practice (Biggs, 2003; Ramsden 2003).

The distribution of the data with 21,4% of the respondents agreeing just over a third (33,9%) disagreeing and a large proportion of the respondents (44,6%) not sure, could be an indicator of uncertainty as to whether their school's curricula are underpinned by modern pedagogic practice and theories.

5.2.7 **Communication and information technology**

The results of this category are presented in Table 4.16.

5.2.7.1 Communication and information technology should be used as a resource for encouraging self-directed learning

93,4% of the respondents agreed, 3,6% disagreed and only 2,9% were not sure.

According to Kassebaum et al. (2004:920) one of the many proposed dental education reforms is to "use the capacities of information technology to enrich and diversify students' learning experiences". This is further supported by Mattheos et al. (2008) who clearly state that information technology should be

used to enrich instructional interaction and support individuals learning paths.

It would appear that almost all of the respondents agreed that information technology should be used as a resource for encouraging self-directed learning. This is not surprising due to the increased use of technology within dental schools to consolidate the process of learning, particularly self-directed learning.

5.2.8 Service learning

The results of this category are presented in Table 4.17.

5.2.8.1 Service learning must be integrated into the curriculum with time for student reflection on their expertise

85,4% of the respondents agreed, 4,8% disagreed and 9,7% were not sure.

According to Toole and Toole (1995) within the context of service learning there is reflection before experience, reflection during experience and reflection after experience, which means dental curricular must allow for time for students to reflect about what they are doing in order to encourage them to be competent in reflective practice (Hendricson et al., 2006).

Furthermore, among the frequently cited benefits to student participants in service-learning are developing the habit of critical reflection, deepening their comprehension of course content; integrating theory with practice; increasing their understanding of the issues underlying social problems; strengthening their sense of social responsibility, enhancing their cognitive, personal and spiritual development and sharpening their abilities to solve problems creatively and work collaboratively (Eylers and Giles, 1999). It is therefore encouraging that 85,4% of the respondents agree that service-learning must be integrated into the curriculum with time for student reflection on their expertise. This point of view is further elucidated by Luckett (2001) when she says that community engagement improves and sharpens the personal competence of the student.

5.2.8.2 Service learning is an important form of pedagogy in dental education

74,8% of the respondents agreed, 5,4% disagreed and 19,8% were not sure.

It is encouraging to observe that the majority of the educators agreed with the statement because according to Boyd (2008) the pedagogy of service-learning is important as it is used as a means of encouraging or stimulating reflective thinking and or practice among health professionals as well as encouraging reciprocity between students and the community they serve.

Service-learning is one of several trends in pedagogy that together mark a shift in undergraduate education from an emphasis on teaching to one on learning. Among the other trends are a focus on problems rather than disciplines, an emphasis on collaborative rather than individual learning, the use of integrative technology, and careful articulation of learning outcomes coupled with assessment of learning success. As a complementary trend, service-learning is a technique of learning, a way to strengthen learning. It enhances academic learning and promotes civic learning on the one hand and moral learning on the other (Boyd, 2008).

5.3 Summary of perceptions of educators by demographic and or biographic variables

The variation of perceptions by demographic and or biographic variables are indicated in Tables 4.18 to 4.24. The focus of this data analysis was to match the eight categories against the demographic and biographic variables. Table 4.23 shows a summary of responses in category 4 + 5 (positive responses) by years in academic dentistry,

As indicated in the previous chapter, Fisher's exact test was used for comparison of three percentages where there was a consistent upward or downward trend over the three categories, as an indication of the significance of that trend. The category of evidence based health sciences education showed a consistent increase of positive responses by number of years in academic dentistry. This consistent upward trend was found to be statistically significant ($p < 0,05$).

Similar observations were made by Kassebaum et al. (2004), that the number of years in academic dentistry seem to have an influence on the teachers perceptions of evidence based health sciences methodology. It would appear that moving from a novice clinician / educator to an expert clinician is associated with the ability to make meaning of the information available and make connections to other data (Regehr and Norman, 1996), hence the consistent increase of positive responses by number of years in academic dentistry.

From Table 4.23 there seems to be an inverse relationship between community orientation and numbers of years in academic dentistry i.e. consistent decrease in community orientation with the increase in years in academic dentistry (Davies, 1999; Masella, 2005) even though this tendency was not found to be statistically significant.

A similar trend was observed with problem-based learning, where there was a consistent decrease with the number of years in academic dentistry even though this trend was not found to be statistically significant. It would seem that the more experienced teachers tend to be more entrenched in the traditional approach to teaching and learning (Hendricson and Cohen, 2001).

Table 4.24 shows a summary of responses in category 4 + 5 (positive responses) by age cohort.

Education for capability does not seem to be influenced by the age of the respondents. Community orientation on the other hand showed a consistent downward trend. When using Fisher's exact test it was found to be significant at the 10% level. This perspective is confirmed by Crain (2008) when she analyzes factors influencing change in dental education. In Table 4.23 there was also a downward trend between community orientation and academic experience which is closely associated with the age of the respondents. A central component of community-based education is reflection (Seifer, 1998; Eckenfels, 1997). In the absence of reflection, a service experience will merely constitute an event (Eyler and Giles, 1999). Reflection as a mode of inquiry is therefore key important to gain meaning and education from a service experience (Eyler, Giles and Schmiede, 1996). However, this reflection by

students must be facilitated or stimulated by the teacher or lecturer. It would appear that the younger educators are more amenable to this type of pedagogy.

According to Fraser and Bosanquet (2006) the term curriculum can have different meanings – product or process. For those with a product focus, the curriculum means a unit or programme outline that defines the content and directs students' learning, it is usually teacher-centred. For those with a process focus, the curriculum frames the learning environment, has a strong focus on processes of learning and students and teachers collaborate, communicate and challenge each other. It would appear therefore, that the number of years in academic dentistry and the age of respondents have an influence on the inclination of the teacher being either product or process focused.

With self-directed learning there was an upward trend with the age cohorts. However, it was found not to be statistically significant.

With problem-based learning there was a downward trend by age cohorts, although not statistically significant. A similar trend was observed in Table 4.23 which seems to imply that age and or number of years in academic dentistry has an influence on the inclination or not towards problem-based learning.

5.4 Conclusion

What seems to emerge from the interpretation of results is the following:

- Ownership of the curriculum by all relevant stakeholders is not sufficiently emphasized in South African dental schools. This therefore implies that there is not sufficient centralized curriculum planning.
- There seems to be minimal encouragement by educators of vertical integration between the basic sciences and the clinical sciences.

- Most of the educators do not perceive early clinical contact with patients as important and by implication disregard the importance of context specificity in the teaching and training of dentists.
- The educators' perception is that establishing a core curriculum will have no benefit to controlling information overload.
- Most of the educators are products of the traditional curriculum and as a result have difficulty in adapting to change.
- Most of the educators are of the opinion that imparting knowledge does not contribute to resistance to curriculum change.
- In terms of curriculum organization and planning, most of the educators are product rather than process oriented, as a result the curriculum is teacher-directed.
- A large proportion of the educators agree with the application of constructive pedagogy.
- The majority of educators have a perception that teaching is not a form of scholarship, they would rather spend more of their time doing research. This assumes that the research they would be undertaking would not be educational research.
- Most of the South African dental schools emphasize transferring technological skills to students.
- Most of the educators agree with curricula with community orientation that support and encourage experiential learning by students.
- Even though there seems to be support for the process of learning facilitation rather than didactic teaching, most of the educators are essentially oriented towards traditional teaching.

- It would seem that most educators in South African dental schools do not use PBL in their teaching and learning practice.
- The high proportion of educators who were not sure about the evidence base of the curriculum change within their schools, could be associated with the current culture within South African dental schools of downplaying the scholarship of teaching (including educational research).
- Almost all the educators agree that information technology should be used as a resource for encouraging and supporting self-directed learning.
- Most of the educators had a positive perception of service-learning as a form of pedagogy.
- The category of evidence-based health sciences education showed a consistent increase of positive responses by number of years in academic dentistry. This observation could be related to the more experienced educator having the ability to make meaning of the information available and make connections to other data.
- It would seem from the data analysis that the more experienced educators tend to be more entrenched in the traditional approach to teaching rather than the learner-centred approaches.
- On the contrary it would appear that the younger inexperienced educators are more amenable to innovative forms of pedagogy such as community-based education and problem-based learning.

This chapter has attempted to interpret the meaning of the data and discuss the data within the context of the theoretical base of the study, viz. the review of the relevant literature. The final chapter will present the overall conclusions of the study and make possible recommendations.

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The main purpose of this study was to explore the influence (if any) on South African dental educators perceptions towards curriculum change or innovation which has occurred in South African dental schools, and to assess their orientation to modern pedagogic practices. The conclusions derived from the findings of this study are presented in this chapter and possible recommendations towards each category of the question in the questionnaire are made.

6.2 Conclusions

From the statistical analysis of responses in the empirical part of this study, the following conclusions were drawn.

6.2.1 Curriculum organization (Table 4.9)

- (i) The perceptions of educators about curriculum ownership within their dental schools seem to indicate uncertainty that the curricula in the dental schools is a product of consensus among staff members and students.
- (ii) The perception of educators about integration of basic sciences with medical and dental sciences seems to indicate that there is no need for integration. There should be a disconnect between basic sciences and the medical and dental sciences.
- (iii) The perception of the educators is that there is no need for early clinical contact with patients by our students because it has no benefit to them.

- (iv) The perception of the educators is that there is no need for establishing a core curriculum as it will not assist in controlling information overload.
- (v) The educators admit to having difficulty in adapting to a different curriculum because they are products of a traditional curriculum.

It would appear that the prevailing personality of dental faculty is that of being conservative cautious and risk averse.

- (vi) The perception of the educators is that the pleasure and fulfillment of imparting knowledge to students does not contribute to resistance to curriculum change.

The evidence from the literature on the contrary states that teacher-directed curricula have difficulty in adapting to change (Oliver et al, 2008). Deeply ingrained instructional behaviours and personal philosophies about teaching influence curriculum change.

- (vii) The perception of the educators is that teacher-centred delivery of a curriculum ensures preservation of departmental structures.

According to Crain (2008) departmentalization contributes to parochialism and resistance to change among educators.

- (viii) The perception of the educators is that an integrated curriculum model does not undermine departmental borders.

This therefore means that a dental school can have an organizational structure comprised of departments and still have an integrated curriculum. The possible route of managing this process is via “conceptual themes” with inputs from various departments as in for example a spiral curriculum (Harden, Davis and Crosby, 1997).

- (ix) The perception of the educators is that a good teacher is one who effectively conveys knowledge to students.

There seems to be a tendency to still believe in the traditional approach to teaching.

- (x) The perception of the educators is that good teaching promotes discovery and construction of knowledge by students.

Discovery and construction of knowledge by students should not depend on traditional didactic approaches to teaching only, one would like to assume that the educators are aware of other approaches such as problem-based learning, case-based learning and service-learning that indeed assist in discovery and construction of knowledge and assist in critical reflection by our students. Good teaching must facilitate such processes.

- (xi) The perception of the educators is that their students prefer interactive classes rather than lectures.

- (xii) The perception of most educators is that teaching is not a form of scholarship, they would rather spend more of their time doing research.

Standards may also be conceptualized in the form of competencies defined as outcomes expected of teachers and graduates (Harden, Crosby and Davis, 1999). Clear, well-established rules, expectations and standards exist for the conduct of research and patient care. The culture of research and patient care endeavours is highly developed and almost universally accepted in most dental schools in South Africa, not so for education. A double standard exists: one for research and patient care and another for education (Mennin, 2005).

- (xiii) The perception of most educators is that it is important that student assessment procedures reflect the learning outcomes.

This is a principle that is in line with outcomes-based education.

6.2.2 Education for capability (Table 4.11)

- (i) The perception of educators is that the learning culture in their dental school is on transferring technological skills to students.
- (ii) The perception of educators is that the learning culture in their dental school engages and challenges students to critically integrate biomedical sciences into clinical dentistry.

6.2.3 Community orientation (Table 4.12)

- (ii) The perception of educators is that connecting academic work with community service through structured reflection is beneficial to their students.
- (iii) Final conclusion

This therefore implies support for reflective practice by the educators.

6.2.4 Self-directed learning (Table 4.13)

- (i) The perception of educators is that active learning techniques cannot be used among large numbers of students.
- (ii) The perception of educators is that their role as lecturers is to facilitate the process of learning rather than teach.
- (iii) Final conclusion

Good teaching entails facilitating the process of active learning.

6.2.5 Problem-based learning (Table 4.14)

- (i) The perception of educators is that problem-based learning is not an important educational strategy for integrating the various components of the curriculum.
- (ii) The perception of educators is that there is no difference in outcomes between the traditional approach to teaching and problem-based learning.
- (iii) Final conclusion

Most of the educators have a poor understanding of problem-based learning.

6.2.6 Evidence-based health sciences education (Table 4.15)

- (i) The perception of educators is that the curriculum change that has occurred in the faculty / school is a result of evidence gathered from educational research in the literature.
- (ii) The perception of educators is that the curriculum change that has occurred in the faculty / school is not opinion-based but evidence-based.

What is also evident from the data is that a large proportion of the respondents were not sure with their response to these statements in (i) and (ii).

- (iii) Final conclusion

The perception of the educators is that the curriculum change that has occurred in their faculty / school is underpinned by evidence-based methodology.

6.2.7 Communication and information technology (Table 4.16)

- (i) The perception of most educators is that communication and information technology should be used as a resource for encouraging self-directed learning.
- (ii) Final conclusion

The use of communication and information technology as a resource to facilitate self-directed learning had almost unanimous support among the educators.

6.2.8 Service-learning (Table 4.17)

- (i) The perception of most educators is that service learning must be integrated into the curriculum with time for student reflection on their expertise.
- (ii) The perception of most educators is that service learning is an important form of pedagogy in dental education.
- (iii) Final conclusion

There is a general consensus among educators of the usefulness and importance of service-learning.

6.3 Perceptions of educators by demographic and or biographic variables

Note: Only those that were found to be statistically significant are reviewed.

6.3.1 Evidence-based health sciences education (Table 4.15)

The category of evidence-based health science education showed a consistent increase in percentage response by number of years in academic dentistry.

6.3.2 Final conclusion

The number of years in academic dentistry seems to inculcate a culture of evidence-based educational methodology among the educators.

6.3.3 Community orientation (Table 4.12)

The category of community-orientation showed a consistent downward trend with increase in age cohort. This therefore implies that the younger educators are more community orientated than their older counterparts.

6.4 Overall concluding remarks

The overall concluding remarks derived from this study are the following:

- From an organizational point of view dental schools in South Africa tend to exist as “closed systems” in which stability, group loyalty, clear boundaries, security and tight controls are emphasized (Berquist, 1992; Goffee and Jones, 1996; Schein, 1996). The tendency is that this type of system does not encourage the self-critique and dialogue that are needed for self-development and progress among teachers or lecturers. Of particular importance though is that “closed systems” tend to be slow to respond to challenges and that when change occurs it tends to happen slowly as is apparently happening in South African dental schools.
- Implementing change within South African dental schools will require an open organizational structure in which flexibility, collaboration, consensus and communication are emphasized.
- South African dental schools, for the most part, have not traditionally cultivated a culture or reward system that values teaching excellence, evidence-based educational methodology, or scholarship that might otherwise predispose academic staff to openness to change and innovation.

- Even though South African dental schools are supposed to be learning organizations, there is a tendency to de-emphasize the scholarship of teaching.
- Despite the drive for integration within the curriculum, most of the teachers or lecturers' perceptions seem to indicate that there should be a disconnect between the biomedical and dental disciplines in the curriculum.
- There seems to be a strong tradition of departmental autonomy and faculty allegiance to disciplines rather than to the dental school as a whole.
- The product model of curriculum development is teacher centred i.e. the teacher or lecturer has the knowledge and transmits this to students who receive it passively. This model seems to be the predominant perception of teaching among the older and more experienced teachers who are "set in their ways" (Carrotte, 1994:219), and have difficulty in changing to the more progressive process model which is student centred, where the teacher or lecturer provides an environment that is catalytic to self-directed learning. Furthermore, it would appear that the younger teachers or lecturers are more adaptable to self-directed learning modalities, such as problem-based learning and community-based education.

6.5 Recommendations

The recommendations that flow from this study are the following:

- Overall staff development strategies should be implemented within each dental school. For example, a dental education advisor at either senior lecturer or professorial rank can be appointed within each dental school. Such advisors would be in an ideal position to organize staff development sessions in education practice. These sessions could be organized on a school, departmental or individual basis. It would be more effective to link such practice to staff appraisal, especially if such appraisal is truly developmental rather than critical or punitive.

- Teaching as a form of scholarship should be given the same weighting and significance as research and patient care.
- Innovation, development and change in dental education at a number of progressive dental schools in the world, have carried with them a growing appreciation of the importance of education and teaching (Oliver et al, 2008). At these schools broader definitions of scholarship have emerged along with corresponding changes in their respective academic reward systems. Similar trends should be emphasized within South African dental schools.

The definition of scholarship generally applied to South African dental schools is unnecessarily narrow and tends to exclude areas of legitimate academic activity and productivity that are vital to the fulfillment of the school's educational mission. Scholarship is demonstrated only by research, peer review of results, and dissemination of new knowledge. For this reason, faculty who are essential to the core educational mission of their dental schools often are not promoted because they do not engage in accepted forms of scholarship. Yet, the same faculty may conceptualize, design, implement, or evaluate new curricula, interdisciplinary courses or modules, assessment instruments and web-based learning materials.

The fundamental recommendation here is that South African dental schools must seriously consider rewarding and recognising the scholarship of teaching. This can for example be in the form of creative teaching with effectiveness that is rigorously substantiated, educational leadership with results that are demonstrable and broadly felt, and educational methods that advance students' knowledge.

- Curriculum ownership by all stakeholders within dental schools must be encouraged. It is important to involve as many people as possible because people change more easily when they are involved in the process. One convenient way would be to establish a number of small "task and finish" groups, each with a clearly defined remit; the outcomes of which feed into the curriculum development committee of the schools that has a strategic view of the entire process.

- It would be very useful in future to undertake qualitative research among teachers in order to further elucidate and understand curriculum innovation or change from their perspective. One of the underpinning philosophies of qualitative research from a social scientist's perspective is the belief that human actions are strongly influenced by the settings in which they occur. Such a study or studies would assist in crystallising or developing context-bound generalizations.

6.6 Limitations of the study

The study did not have a qualitative component which would further validate the observed perceptions. This perspective would provide a deeper meaning to the perceptions.

6.7 Concluding remarks

Cornbleth's perspective of the curriculum as "contextualized social practice" (1990:6) viz. "an ongoing social process comprised of the interaction of students, teachers, knowledge and milieu" became evident to me as a re-searcher for the following reasons:

- a) An effective teacher needs to constantly question his or her educational practice, examine his/her role as a teacher, constantly identify the outcomes of his/her teaching, and assess not only the student's progress but also his or her own pedagogic practice. This is captured by the concepts of reflection in practice and reflection on practice (Luckett, 2001).
- b) Furthermore, Fish and Cole (2005) refer to the product, process and research models of curriculum development. The shift from product to either process or research orientation will require teachers or lecturers to stand back and reflect, and or review their frames of reference and epistemology and recognize the validity of other forms of knowing, thereby constantly improving their educational practice. This approach will encourage and develop meaningful social interactions among students themselves, staff and students and as a result, establish what Gravett

(2004:30) profoundly refers to as a “community of inquiry and interpretation”.

**OFFICE OF THE DIRECTOR/CEO
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Letter to Deans:

Dear,

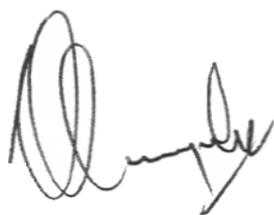
I am in the process of undertaking a cross sectional survey entitled *“An explorative study on curriculum innovation among educators in South African dental schools: Attitudes, beliefs and perceptions”*.

I am therefore humbly requesting your permission to undertake this study among teaching staff in your Faculty or School.

The information supplied by respondents will be confidential, and will assist in establishing some baseline information about issues associated with curriculum innovation.

Your assistance will be highly appreciated.

Yours sincerely



**TSHEPO GUGUSHE (PROF)
DIRECTOR: SCHOOL OF DENTISTRY
CEO: MEDUNSA ORAL HEALTH CENTRE**

21 February 2007

UNIVERSITY OF LIMPOPO

Medunsa Campus



P O Medunsa
Medunsa
0204

Tel: +27 12 521-4800
Fax: +27 12 521-4102

Dear Colleague

I am in the process of undertaking a cross sectional study entitled *“An explorative study on curriculum innovation among educators in South African dental schools: Attitudes, beliefs and perceptions”*.

I am therefore humbly requesting you to kindly afford me some of your time by completing the attached questionnaire.

The information supplied by yourself will be confidential, and will assist in establishing baseline information about issues associated with curriculum development.

Your assistance will be highly appreciated.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Tshepo Gugushe', written in a cursive style.

TSHEPO GUGUSHE (PROF)
DIRECTOR: SCHOOL OF DENTISTRY
CEO: MEDUNSA ORAL HEALTH CENTRE

31 May 2007

QUESTIONNAIRE

FOR OFFICE USE ONLY				
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SECTION A:

Kindly mark with an "X" in each relevant box

- 1 Indicate your gender

	Male	<input type="checkbox"/>	1
	Female	<input type="checkbox"/>	2

- 2 Indicate the University you belong to

	University of Limpopo	<input type="checkbox"/>	3
	University of Pretoria	<input type="checkbox"/>	4
	University of the Witwatersrand	<input type="checkbox"/>	5
	University of the Western Cape	<input type="checkbox"/>	6
	University of KwaZulu Natal	<input type="checkbox"/>	7

- 3 Indicate whether you are full time or part time

	Full time	<input type="checkbox"/>	8
	Part time	<input type="checkbox"/>	9

- 4 Indicate to which of the following oral health professions you belong to:

	Specialist	<input type="checkbox"/>	10
	Stomatologist	<input type="checkbox"/>	11
	Dentist	<input type="checkbox"/>	12
	Dental Therapist	<input type="checkbox"/>	13
	Oral Hygienist	<input type="checkbox"/>	14

- 5 Number of years in academic dentistry:

	< 5 years	<input type="checkbox"/>	15
	5-10 years	<input type="checkbox"/>	16
	11-15 years	<input type="checkbox"/>	17
	16-20 years	<input type="checkbox"/>	18
	21-25 years	<input type="checkbox"/>	19
	26-30 years	<input type="checkbox"/>	20
	> 30 years	<input type="checkbox"/>	21

- 6 Indicate your current academic rank

	Professor	<input type="checkbox"/>	22
	Associate Professor	<input type="checkbox"/>	23
	Senior Lecturer	<input type="checkbox"/>	24
	Lecturer	<input type="checkbox"/>	25
	Other (specify)	<input type="checkbox"/>	26

7	Indicate your age cohort	< 30 years 31-35 years 36-40 years 41-45 years 46-50 years 51-55 years 56-60 years 61-65 years > 65 years	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="height: 20px;"></td></tr> </table>											27 28 29 30 31 32 33 34 35
8	The courses or modules you teach could be categorised into one of the following:	Clinical Biomedical science Pre-clinical Community and/or public health Behavioural science Other (specify)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="height: 20px;"></td></tr> </table>							36 37 38 39 40 41				
9	Are you part of your school's curriculum development committee? (or an equivalent committee)	Yes No	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> </table>			42 43								

SECTION B:

On a Likert scale of 1 to 5, kindly respond to the following statements by marking with an "X" in each relevant box

1	2	3	4	5
Strongly disagree	Disagree	Not sure	Agree	Strongly agree

10	The current curriculum in my dental school is a product of consensus among staff members and students	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> <td style="width: 20px; text-align: center;">5</td> </tr> </table>	1	2	3	4	5	44
1	2	3	4	5				
11	It is of no importance to integrate basic sciences with medical and dental clinical sciences	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> <td style="width: 20px; text-align: center;">5</td> </tr> </table>	1	2	3	4	5	45
1	2	3	4	5				
12	Early clinical contact with patients by our students has no benefit to them	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> <td style="width: 20px; text-align: center;">5</td> </tr> </table>	1	2	3	4	5	46
1	2	3	4	5				
13	Establishing a core curriculum will not assist in controlling information overload	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> <td style="width: 20px; text-align: center;">5</td> </tr> </table>	1	2	3	4	5	47
1	2	3	4	5				
14	Being a product of the traditional curriculum I have difficulty in adapting to a different curriculum	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> <td style="width: 20px; text-align: center;">5</td> </tr> </table>	1	2	3	4	5	48
1	2	3	4	5				

15	The pleasure and fulfilment of imparting knowledge to students can contribute to resistance to curriculum change	1	2	3	4	5	49
16	Teacher-centred delivery of a curriculum ensures preservation of departmental structures	1	2	3	4	5	50
17	An integrated curriculum model undermines departmental borders	1	2	3	4	5	51
18	A good teacher is one who effectively conveys knowledge to students	1	2	3	4	5	52
19	Good teaching promotes discovery and construction of knowledge by students	1	2	3	4	5	53
20	My students prefer lectures to interactive classes	1	2	3	4	5	54
21	Teaching in my opinion is not a form of scholarship, I would rather spend more of my time doing research	1	2	3	4	5	55
22	Active learning techniques cannot be used among large numbers of students	1	2	3	4	5	56
23	My role as a lecturer is to facilitate the process of learning rather than teach	1	2	3	4	5	57
24	The learning culture in my dental school is on transferring technological skills to students	1	2	3	4	5	58
25	The learning culture in my dental school engages and challenges students to critically integrate biomedical sciences into clinical dentistry	1	2	3	4	5	59
26	Problem-based learning (PBL) is not an important educational strategy for integrating the various components of a curriculum	1	2	3	4	5	60
27	There is no difference in outcomes between the traditional approach to teaching (i.e. lectures) and PBL	1	2	3	4	5	61
28	It is important that student assessment procedures reflect the learning outcomes	1	2	3	4	5	62

29	Connecting academic work with community service through structured reflection is beneficial to our students	1	2	3	4	5	63
30	Service learning must be integrated into the curriculum with time for student reflection on their expertise	1	2	3	4	5	64
31	Service learning is an important form of pedagogy in dental education	1	2	3	4	5	65
32	Communication and information technology should be used as a resource for encouraging self-directed learning	1	2	3	4	5	66
33	The curriculum change that has occurred in our faculty/school is a result of evidence gathered from educational research in the literature	1	2	3	4	5	67
34	The curriculum change that has occurred in our faculty/school is opinion-based rather than evidence based	1	2	3	4	5	68

I THANK YOU FOR YOUR TIME

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