THE PERCEPTIONS OF SECOND YEAR MEDICAL STUDENTS TOWARDS THE PROBLEM-BASED CURRICULUM AS COMPARED TO THE TRADITIONAL CURRICULUM

by

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submitted in fulfilment of the requirements for the degree of

MASTER OF EDUCATION

in the subject

DIDACTICS

at the

UNIVERSITY OF SOUTH AFRICA

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JUNE 1996

Student number:534-215-5

PREFACE

"I declare that, THE PERCEPTIONS OF SECOND YEAR MEDICAL STUDENTS TOWARDS THE PROBLEM-BASED CURRICULUM AS COMPARED TO THE TRADITIONAL CURRICULUM, is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references".

S Hassan

SIGNATURE

(MRS.S.HASSAN)

26/08/1996

DATE

ACKNOWLEDGEMENTS

I would like to thank:

Professor M.P. van Rooy for his advice and guidance during the supervision of this thesis.

The MBChB 11 students (class of 1993 & 1994) at the University of Transkei who participated so willingly in this study.

My colleagues at the University of Transkei for their help and encouragement.

My family for moral support.

The University of South Africa for awarding me a Master's Exhibition to undertake this study.

ABSTRACT

The main hallmarks of the novel problem-based curriculum are self-directed, student-centred learning, clinical reasoning, small group tutorials and the facilitation of learning in an integrated way. These features differ significantly from the traditional curriculum which is teacher-centred, discipline-based and more content orientated.

The innovative programme was implemented at the University of Transkei with a view to improving medical education. In this study, the perceptions of second year medical students regarding the implemention of and transition to the new curriculum, was assessed, as part of the evaluation of the curriculum.

The results showed that students had grievances about the overwhelming volume of information they had to cover, time constraints, examination methods and bias of tutors towards their own subjects. Nevertheless, they considered the innovation to be favourable, exciting, relevant to life and to future tasks, and more motivating than the traditional curriculum.

Key Terms:

Problem-based curriculum; Problem-based learning; Traditional curriculum; Curriculum development; Medical education; Second year medical students; Student perceptions; Small group tutorials; Self-directed learning; Clinical reasoning; problem-solving.

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CHAPTER 1

INTRODUCTION AND ORIENTATION

We are entering the information age. New information is generated daily and much of that information will become obsolete. It is no longer enough to teach medical students every single thing about the medical sciences. They should be able to learn how to learn, how to select and integrate appropriate information to diagnose and manage their patients' problems in the most effective and efficient way (Kaufman, 1985: 17).

The traditional lecture is usually the predominant form of instruction in the preclinical years. Students are passive learners and receive answers to questions they may not have raised. Kaufman (1985:17) asserts that,

> "the curriculum is lock-stepped for the efficiency of the teacher, more than for the learner."

Knox (1989:51), complains that in the past medical education has imposed a premium on didactic teaching and on assessment by testing factual recall of information. The practice of medicine is, however, more complicated since it focuses on the application of scientific thinking and other abilities to the care of patients. Acknowledgement of this phenomenon has led to a quest for a more problem-based approach to learning and assessment.

Problem-based learning (PBL) refers to educational methods that use problems in the instructional sequence for achieving certain objectives (Barrows, 1986: 481). Thus, PBL is amenable to

individualization of instruction, helping students to focus on relevant issues. When students are allowed to assume control over the depth, speed and direction of their study, frustration is lessened and the academic environment becomes more conducive to learning (Kaufman, 1985: 17).

The problem-based curriculum (PBC) provides a student-centred learning environment and encourages self-directed learning as opposed to the short-term learning techniques induced by the traditional curriculum (Schmidt, Daphinee & Patel, 1987: 305).

1.1 Discussion of factors that prompted this study.

1.1.1 Implementation of the problem-based curriculum at the Medical Faculty, University of Transkei, (Unitra).

For many years, second year medical students in the Faculty of Medicine at Unitra (the didactic environment of this study) have received most of their instruction in Biochemistry, Anatomy, and Physiology, in a lecture format. This approach was abandoned in favour of an integrated, problem-based method because of the need to restructure the medical curriculum for improvement of medical education.

Problem-based learning is defined as learning that results from the process of working towards the understanding or resolution of a problem (Barrows, 1986: 481). The problem is encountered first and serves as a stimulus for the application and development of problem-solving skills and the search for the knowledge to fathom out the mechanism responsible for the problem and its resolution (Walton & Matthews, 1989: 550). This method manifests itself in self-directed learning which, according to

Knowles, (1988: 63), is an ideal of tertiary education. Knowledge in this model of learning is not so much received as discovered. Therefore it is referred to as an "experential curriculum" (Ende & Davidoff in, Bryant, 1993:224).

According to Bryant (1993:219), the most difficult challenge for tertiary institutions at present is that of associating themselves with the community. If they decide that it is important to do so, the dilemma faced is whether to observe and study or participate in health related programmes. An example of such involvement is PBL in community settings. An extra effort is the formation of University Partnership Programmes which aims to explore the feasibility of partnerships of universities, governments, students and communities in pursuing research to improve health services

At Unitra, this new programme could be described as an experiment since it is a novel experience for students and tutors. It is, therefore, amenable to analysis and critical evaluation, which could result in modification of the innovation.

1.1.2 Problems associated with the implementation of the problem-based curriculum.

Walton & Matthews (1989: 543) state that one of the problems of introducing PBL to medical schools is that many students suffer the culture shock of transition from being passive recipients of information to becoming active learners. The second year medical students at Unitra might not be immune to this type of stress.

Also, the introduction of this method of instruction encourages independent learning and the acquisition of problem-solving

skills. Although it seems that most students readily accepted this novel way of learning, it was felt that the attitudes of all students should be determined in an objective and scientific manner.

Together with the many advantages associated with PBL (see 2.8.1), there are also some disadvantages (see 2.8.2). Certain students might have qualms about the implementation of the new curriculum and this writer was eager to know what grievances these students were harbouring, so that they could be adequately addressed.

Furthermore, assessing the attitudes of the students towards this method of instruction would be helpful in evaluating the curriculum so that it could be further developed along certain guidelines.

Another factor is that performance in the first quarterly examination was perturbing in that there was such a high failure rate (50%) in Biochemistry and Physiology. There is obviously an underlying problem which has to be addressed.

The problem-based curriculum lends itself to student-centred, problem-based, small group tutoring. Some students find this approach appealing, others have inhibitions about engaging in discussion and have to be constantly coerced to be active participants. It would be both interesting and viable to learn the response of these students to PBL.

1.2 Statement of the problem.

The PBC seems to have certain advantages in general and with respect to medical education in particular. The novel

curriculum, however, has a specific effect on students. This study, therefore, investigates the possible difference in the perceptions of second year medical students towards the integrated problem-based curriculum as compared to the traditional curriculum.

1.3 Analysis of the problem.

1.3.1. Transition to independent learning

When you are doing something you have not done before, you are bound to have problems that have not been envisaged. It is important to know what these problems are so that they can be rectified.

Ryan (1993:55) claims that the process of transition from dependence to independence as learners, can be difficult for both lecturer and student. While the lecturer may be reluctant to transfer the responsibilities for learning to the students, the students in turn may also have problems adjusting from dependent learning practices. In fact, Candy (Ryan, 1993:55), questions whether it is reasonable to expect adult students to automatically assume control of learning when their experiences at school have actively discouraged this independence. In this writer's opinion :

> "it is important to determine empirically, the views of students on independent learning."

1.3.2 The importance of students' perceptions

> "The way students perceive the content of the curriculum and the instructional philosophy underlying

> it, may influence their emotional well-being and motivation to learn" (Schmidt et al., 1987 : 310).

Bandaranayake (1989:39,44) endorses the importance of student opinion by stating that positive student opinion is powerful in maintaining an innovation. Genuine opinion of the larger student body should be sought as part of an on-going evaluation of the curriculum. Students are central to the processes involved in an innovation and know best how they affect them.

Bandaranayake (1989: 44) cites that a common practice is to judge the effectiveness of a curriculum on the performance of students at internal examinations. Performance is based on several factors one of which is the calibre of students. Therefore, it would be unscientific to judge an innovation merely by examination performance, without adequate safeguard to control other variables. In this author's view,

> "a qualitative assessment of the innovative curriculum at the Unitra would be more feasible at this stage."

Entwistle (1992:601) claims that whether students adopt a surface or deep approach to learning (see 2.7.8) depends on an interaction between the student and the learning environment, on the perception of the learning environment and not just on the learning environment itself. Also, since the interaction between learner and the learning environment depends on perceptions, it is not only continually changing but varies from person to person.

1.3.3 Differences in student perceptions

According to the literature, students at different universities have different perceptions of the problem-based curriculum.

Students at a New Mexico University perceived their learning environment as more flexible, meaningful and having a better emotional climate than students in the conventional track (Baca, Mennin, Kaufman & Moore-West, in Schmidt et al., 1987: 310). Students at a Dutch university, however, did not consider their medical schools to be an ideal environment for fostering motivated learning and described their instruction as "dull", "tough", "irrelevant" and "hardly adapted to the needs of practice" (Bender, in Schmidt et al., 1987: 310).

Therefore, one cannot expect the students at Unitra to have preconceived perceptions, similar to those reported in the literature, whether they are positive or negative. There is a need to determine their perceptions in an objective and scientific way.

Furthermore, from informal discussions with students at Unitra, it seems that the change from the traditional curriculum to the PBC has inevitably caused some degree of stress, disappointment and dissonance in some students. This is likely to affect their academic performance and might result in them viewing the PBC in a poor light. Students need to feel that they are being helped and not allowed to fall along the wayside.

Other students have viewed PBL more favourably and given faculty the impression that all is well and that implementation of the new curriculum is a complete success. This could be deceiving, and thus, there is a need to determine the perceptions of students more objectively so that the necessary improvements and changes could be made. If not, faculty would simply be repeating mistakes and frustrating the students.

1.3.4 Importance of determining students' perceptions

The aims of the PBC is to provide a flexible, democratic, student-centred learning environment and to encourage an inquisitive style of learning. This is in contrast to the rote memorization and short-term learning strategies of the traditional curriculum which is implemented in an autocratic climate. The change from the traditional curriculum to the PBC is bound to be met with problems which need to be addressed for more effective implementation of the curriculum.

Additionally, the approaches to learning are part of the students' personality traits and may be influenced by the mode of instruction (Schmidt et al., 1987: 311). If the approaches to learning brought on by the PBC are to the students' disadvantage, faculty would like to be aware of this so that greater support could be given to the student to avoid failure.

Some students are finding it difficult to adapt to self-directed learning which is the hall mark of the PBC. Although PBL means that there is minimal prescription by the lecturer as to how much and what the student should learn, they should not be left to get lost in a jungle of information. It is therefore, important to determine the perceptions of students towards PBL so that any problems experienced could be ironed out.

1.4 Aims and objectives of the study.

1.4.1 General aim

The general aim of this study is to investigate general perceptions of students towards the implementation of the PBC

and traditional curriculum, in general and with respect to medical education in particular.

1.4.2 General objective

Following from the general aim the following general objectives of the study can be stated:

(1) To determine if there is a significant difference in the perceptions of second year medical students towards the integrated, problem-based curriculum, as compared to the traditional curriculum.

(2) To evaluate the newly implemented PBC in terms of efficiency and effectiveness.

1.4.3 Specific objectives:

In terms of the case study at Unitra, this study envisages to reach the following specific objectives:

(1) To find out if students perceive the PBC as being relevant to medical students.
(2) To determine students' experiences with PBL.
(3) To find out how students perceive the present learning environment.
(4) To determine if the students' learning approach have changed to suit the PBC.
(5) To ascertain whether students have become more motivated (or not) with implementation of the new curriculum.
(6) To determine if the aims of the PBC, for example, self-directed learning, effective group interaction , have been achieved.

(7) To provide feedback about the effectiveness of tutoring and teaching.
(8) To facilitate skills in the employment of problem-based education.
(9) To obtain information for further planning of the PBC.

1.5 Clarification of terms

A brief definition of certain terms is given here in order to facilitate an understanding as to how they are used for the purposes of this study.

1.5.1 Problem-based learning

Problem-based learning (PBL) is the learning that results from the process of working toward the understanding or resolution of a problem. The problem is encountered first in the learning process (Barrows & Tamblyn, 1980:1).

1.5.2 Problem-based curriculum

Problem-based curriculum (PBC) refers to the integration of aims,objectives, selection and arrangement of learning processes and activities, and evaluation strategies with respect to particular problem-directed didactic situations. Thus, it is a more comprehensive term than PBL (Schmidt, 1983:11). Problem-based learning (PBL) is therefore a didactic process that provides students with knowledge, skills and attitudes suitable for solving problems manifested by the PBC.

1.5.3 Traditional curriculum

The traditional curriculum uses traditional methods for transmittance of knowledge. It is teacher-centred in the sense

that the teacher is solely responsible for what the student is expected to learn, how it is to be learnt, in what sequence and at what pace (Barrows & Tamblyn, 1980:7).

1.5.4 Perceptions

This refers to the opinions, feelings and attitudes of students with respect to the way they experience, assign meaning to, and are involved in, didactic activities.

1.5.5 Second year medical students.

This refers to students who are studying towards an MBChB degree and are in their second year of training. The majority of students do not have previous tertiary education qualifications, while some have bachelor of science degrees in related fields.

1.6 Methods of research.

The research methods that will be used in this study will involve the following:

1.6.1 Literature study

A literature study will be conducted on the problem-based curriculum and traditional curriculum. Relevant publications on the two curricula will be critically reviewed and analysed and the relevant information used in this research. Lecture notes and written reports presented by visiting consultants who are experts on the PBC, will also be utilized.

1.6.2 Empirical investigation

An empirical investigation will be conducted on students' perceptions towards the PBC as compared to the traditional curriculum. A questionnaire containing open and structured questions on student perceptions will be handed out to all members of the second year group, for completion. An analysis of the items in the questionnaire will be done to determine the perceptions of students towards each item (see 5.6.4 and 5.7.3.2). The unstructured items will be analysed and synthesised to give an overall perception of the two curricula (see 5.6.5 and 5.7.3.3).

1.7 Programme of study.

Aspects that are discussed in subsequent chapters of this dissertation are:

In Chapter 2 the traditional versus problem-based curriculum will be covered. Initially, the concept curriculum is discussed in detail to put into perspective what factors are related to curriculum development and to set the stage for further discussions on the two specific types of curricula concerned with this study. Here, the traditional and problem-based curriculum in general, and a comparison between the two methods, is discussed. Also, on a more specific level, the two curricula are related to medical education and a comparison given. The implementation of both curricula at Unitra is discussed, and each approach weighed against the other. Lastly, an account is given as to which method is more feasible.

In Chapter 3 the Medical Faculty of Unitra as a didactic environment will be explained. In this chapter, the situation analysis is outlined to give an idea of the type and level of students who are involved in this study. Also included, is a typical course layout, the syllabus and the learning-teaching process of the PBC.

The perspectives of the lecturers regarding the novel curriculum is discussed as is the logistical potential of the faculty namely, staff, tutorial rooms, resource centre and time. An overview of the aims and objectivs of the PBC is given and the methods used in the implementation of the curriculum outlined in detail. For example, it is explained how tutorial groups function in PBL and what the clinical reasoning process and self-directed learning entails. A concise account is given of the evaluation methods used in the assessment of student performance in the novel curriculum as well as evaluation of the curriculum itself. Additionally, reactions to the change in curriculum from the students' and lecturers' point of view, is discussed. This chapter will provide the reader with a perspective of the new syllabus, how PBL is being implemented, who is involved and what the reaction is towards this innovation .

In Chapter 4 student attitudes as a variable in adult teaching and learning is outlined. In any didactic situation, the feelings and attitudes of the educator and learner are important. Furthermore, since this study pertains to the perceptions of students towards a novel curriculum, this chapter deals with the affective domain of teaching and learning. Here, the feelings of adults are outlined and the factors that motivate them are discussed. The attitudes of adult learners with respect to the didactic process is also covered. Also, guidelines for the facilitator of learning are outlined to ensure success in

teaching and learning. An overview of what characteristics the ideal facilitator should have, and co-operation within the group, to ensure good interpersonal relationships, are included.

In Chapter 5 the empirical study is discussed. In this chapter, the empirical aspect of the research is described in terms of aims, methods and significance of the research. Thus, a link with the literature study part of the study will be effected.

Therefore, an account will be given of how the questionnaire was designed, namely the type of statements used, the use of the Likert scale as well as development and drafting of statements.

This will describe what the questionnaire consists of and justification given for selection of items. A discussion and synthesis will be given of the results of the final study in 1993 and the follow-up study conducted in 1994.

The structured questions will be analysed and the mean scores interpreted. The unstructured questions will be discussed in terms of the merit, viability, relevance, advantages and disadvantages of the PBC as compared to the traditional curriculum. Therefore, this chapter will provide detailed information on how the empirical section of this research will be conducted and what the results will be.

In Chapter 6 a summary and conclusion will cover a synthesis of the study. The structure used in Chapter 2, describing the concept curriculum, the PBC and the traditional curriculum in general, as well as with respect to medical education in particular, and their implementation at Unitra, will also be used as part of the summary contained in the final chapter. The

change in medical education and the initial resistance to educational change will be discussed. Justification will also be provided as to why the PBC is more feasible.

The approaches to learning by other students, as reported in the literature will be compared to the target group (that is the Unitra students). Evaluation of the curriculum at Unitra, by an external consultant, and by the students, will be summarized. Thus, the final chapter will put the study into perspective, integrating past information with the present research, with a view to future improvement of the curriculum.

CHAPTER 2

THE TRADITIONAL CURRICULUM VERSUS THE PROBLEM-BASED CURRICULUM.

In Chapter 1, a general overview as to why this study is to be conducted and the methods used were given. The clarification of certain terminology was also necessary to orientate the reader towards the novel curriculum, described further in this chapter.

This chapter focuses on the curriculum as a didactic issue as well as the traditional curriculum in general and with respect to medical education in particular. The principles of the novel PBC in general and in medical education, is also elucidated and compared with the traditional programme. The feasibility of both curricula is subsequently assessed.

2.1 The curriculum as a didactic issue

The curriculum serves as the format, laying the basis for the starting point, guidelines, criteria and instructions that would give rise to a well-planned course for the didactic interaction (Fraser et al, 1993:91).

2.1.1 The concept curriculum

There are several diverse definitions of the concept curricula. Zais, in Fraser et al (1993:91), define the curriculum as:

* A programme of study.
* Course content.
* Planned learning experiences.

* Intended learning results.
* A plan for instruction.

Eiser, in Curzon (1990:163), defines curriculum as a

> "series of planned events that are intended to have educational consequences for students".

That is, the management committees would decide on appropriate curriculum goals and the lecturer will translate these goals into instructional programmes, in accordance with availability of resources, modes of instruction and the sequencing of teaching (Curzon, 1990:163).

Fraser et al (1993:92), define curriculum as :

> "...the interrelated system of teaching aims and training outputs, learning and training contents, evaluation procedures and teaching and training activities whereby didactic activities are directed and realised in a planned and responsible way."

This definition of the curriculum distinguishes it from the syllabus which only pertains to the learning content of a subject or course. Aims, guidelines, content and evaluation methods are not covered in a syllabus (Fraser et al, 1993:92).

2.1.2 Subject curriculum

When the curricula refers to a certain subject, standard or year of study, it is refered to as the subject curriculum for that year or course. Fraser et al (1993:92) define a subject curriculum as:

> "...the interrelated totality of particular aims, selected and organized learning content, appropriate evaluation procedures and meaningful teaching-learning opportunities, experiences and activities as didactic guidelines and minimum requirements for the implementation of the didactic activities, as far as they relate to a particular subject, course or year of study".

Teachers can use this blue print for planning, implementing and evaluating didactic activities, as a guideline for drawing up schemes of work and for planning lesson preparations for the day, week or term. The subject curriculum can also be used to decide on intended learning outcomes and how to ascertain whether desired learning results were received. The subject curriculum is being implemented in a lesson when learning objectives are stated, a certain method used for instruction and learners' understanding of learning content determined through oral questioning (Fraser et al, 1993:93).

2.1.3 Components of the curriculum

The first question to be addressed in curriculum design involves "who" is being taught and a situation analysis of the people and the didactic environment to which the curriculum relates, will have to be considered. The issue of "what" is taught pertains to the learning content selected and organized. "Why" certain learning content is taught focuses on the aims of the curriculum. "How" learning content will be taught aims to cover teaching-learning experiences and activities. Evaluation of students' performance and of the curriculum covers the question of "what" results are achieved by teaching. Fraser et al, (1993:93), lists

important components that can be identified from these questions, namely:

* Situation analysis.
* Aims.
* Learning content.
* Teaching-learning opportunities, activities and experiences.
* Evaluation.

2.1.3.1 Situation analysis

This refers to two important concepts: "situation" and "analysis". The situation is the initial state in which the learner finds himself. Situation analysis can also be seen as the recognition of some educational problem which becomes a springboard for curriculum development (Marsh, 1992:79).

By the same token, Fraser et al (1993:94), states that the first aspect to be considered in curriculum design is the people involved in the particular didactic situation. This will cover all factors that impose conditions on and provide guidelines for proper implementation of teaching-learning activities. Variables that must be analysed and put into perspective are the learner, teacher, learning content, society and the didactic environment.

Thus, situation analysis entails an indepth study of the target group. It is important for didactic activities to be put into the context of the learner's life world and world of experience so that it can be more meaningful to the learner. Only when the tutor has an understanding of the learner's previous learning experience and his needs, can he plan , implement and evaluate didactic activities (Fraser etal, 1993:94).

Soliman et al in Marsh (1992:80) have drawn up a situation analysis checklist which covers such factors as:

* Societal and cultural values and expectations.
* Resources and finances.
* Educational systems requirements.
* Content.
* Forms of knowledge.
* Internal factors.
* Learning processes.

2.1.3.2 Aims and objectives of the curriculum

These follow from the situation analysis and provide general guidelines for the educator. Teaching and learning are not random activities but practised with certain aims and objectives in mind. These are statements relating to what must be achieved through implementation of the curriculum. Therefore, aims provide the framework for selection of learning content and also indirectly determines which methods are to be used for getting the content across. Additionally, aims and objectives serve as guidelines for evaluating students' understanding of subject content (Fraser et al, 1993:99).

Objectives, in particular, are a statement of intent about predicted changes in learners. An objective identifies how students should change their behaviour as a result of certain learning experiences (Marsh, 1992:90).

Gagne' in Curzon (1990:172), differentiates the term objectives. Lifelong objectives involve the expectation that acquired skills will still be used after the course has ended. Terminal objectives will state the performance expected from the student

on termination of the course. Specific objectives state the actual outcomes expected fron the student on completion of a unit of instruction.

2.1.3.3 Learning content

In order for the aims and objectives of the curriculum to be achieved, the learning content would have to be properly selected and organized. Therefore, careful selection of learning contents involves demarcating ones that would be used to achieve particular aims. Organization of learning content pertains to the arrangement and presentation of material as a meaningful whole (Fraser et al, 1993:100).

There are various approaches to organization of content, as explained by Marsh (1992:97), namely:

(a) Organizing by subjects-important subjects are taught separately.
(b) Organizing by activity- students' own experience is the starting point for planning.
(c) Organizing by correlation- elements from various separate subjects are correlated and interrelated .
(d) Organizing in broad fields- subject areas are correlated and fused into broad fields of study.

Curzon (1990:172) refers to sequencing or organising, as the process of arranging the order of events of instruction according to some defined pattern. The sequence chosen is intended to promote effective learning. The lecturer will have in mind the objectives, the existing knowledge of the class and his resources. Marsh (1992:99), states that a major challenge is to ensure that the sequence selected results in cummulative and continuous learning as the student progresses through the curriculum.

2.1.3.4 Teaching-learning opportunities, activities and experiences

Teaching-learning opportunities, activities and experiences are selected and planned on the basis of the situation analysis results, the aims of the curriculum and the nature of the learning content. Thereafter, the effectiveness of the didactic activities is monitored through evaluation (Fraser et al, 1993:100).

Having selected and organized the learning content, the tutor has to decide how to get his information across to the learner in a meaningful way. Thereafter, he has to consider which didactic opportunities and activities will have to be used to ensure the learner acquires the desired learning experiences. Fraser et al (1993:100), explains that learning experience relates to the interaction between the learner and the learning content. It is during this interaction that the learner obtains knowledge and skills. Teaching methods and strategies and appropriate media to be used for this purpose will have to be carefuly selected.

There are a variety of methods available and it is imperative that teachers are aware of the range since not all students learn effectively by the same method. A few major methods of imparting content as listed by Marsh (1992:93), include:

* Teacher tasks, mini lectures and demonstrations.
* Discussion, questioning and recitation.
* Practice drills -repetition of a skill until mastery is reached.
* Problem-solving, inquiry, discovery and inductive learning.
* Role-play, games and simulation games.

Curzon (1990:170), asserts that the subject matter itself may dictate the mode of teaching. Students' general abilities and attitudes will also play a role in choosing a mode of instruction. Furthermore, it is worth remembering that no single method is better than another for all types of content (Marsh, 1992:93).

2.1.3.5 Evaluation

This is the process of ascertaining the extent to which the aims and objectives of the curriculum have been actualized. Through evaluation, value judgements about the quality of didactic activities can be made. Fraser et al (1993:101), explains that as a curriculum component, evaluation serves the following functions:

* It provides feedback on the learners' learning experiences and learning accomplishments.
* It diagnoses any teaching-learning problems that may exist.
* It highlights strengths and weaknesses in teaching-learning abilities of the learner and tutor.

Evaluation that takes place during the course of didactic activities is referred to as process or formative evaluation. This type of evaluation is aimed at recognising and correcting limitations in learning and teaching as the student progresses through the course. Product or summative evaluation is effected at the end of a course of study to determine if the objectives were achieved. Evaluation provides the point of departure for situation analysis and the curriculum aims which were generated on the basis of the results of the situation analysis (Fraser et al, 1993:101).

2.1.4 Curriculum development

Fraser et al (1993:102), describes curriculum development as :

> "all the processes necessary to plan, design, implement and evaluate a functional curriculum".

Curriculum development comes to the fore when the effectiveness of an existing curriculum is evaluated and revised. It is also important when a newly designed curriculum is implemented on a trial basis and then evaluated and altered before final implementation. Curriculum development is a continuous, cyclic, dynamic process which demands on-going consideration of all components of the curriculum for more effective didactic involvement (Fraser et al, 1993:102).

2.1.4.1 Factors influencing curriculum development

Fraser et al (1993:103), cite that the factors listed below have a direct implication in curriculum development:

(a) Target group

Socio-economic and cultural factors as well as cognitive abilities of learners must be taken cognisance of when planning, implementing and evaluating the didactic activities. The curriculum should take into account the frame of reference of the target group and should not be divorced from the world of experience of the learner.

(b) Academic staff

Fraser et al (1993:103) argues that it is pointless planning the ideal curriculum if there is insufficient staff to implement it effectively. Also, many teachers are reluctant to accept innovative curriculum changes (Fraser et al, 1993:103).

(c) The knowledge explosion
New information and knowledge is generated daily and this demands constant revision of the curriculum because the learning content has to be constantly altered. Furthermore, learning and teaching experiences and activities also undergo constant changes with the advent of newer and more sophisticated media (Fraser et al , 1993:103).

(d) Social demands
Education functions in the context of changing societal demands and needs, in an organized manner. The curriculum is the means by which educational institutions can respond to such demands (Fraser et al, 1993:104).

(e) Logistic potential of the institution
This will have a bearing of what will be achieved in terms of realization of the aims of the curriculum. For example, there is no point in planning computer assisted instruction courses if the institution cannot afford computers (Fraser et al, 1993:104).

2.1.4.2 Stages of curriculum development

A curriculum development model described by van Rooy (1990:19-24) involve the following general design steps:

(a) Setting the problem. This refers to the need that gave rise to the decision to change the curriculum.
(b) Conducting a situation analysis and needs analysis. That is the analysis of factors such as the target group, logistics and other practical considerations.

(c) Formulating aims and objectives of the curriculum. This is the specific and general intentional activities directed at achieving certain results.

(d) Selecting and sequencing learning contents. The determination of what is to be learnt in the curriculum is covered.

(e) Selecting instructional activities and processes. This will indicate how the teaching will be presented to attain the objectives of the course.

(f) Evaluating instructional processes and outputs. This involves value judgements regarding the quality of teaching and training and the performance of learners.

Fraser et al (1993:105), explain that the main stages of curriculum development include planning, design, implementation and evaluation.

(a) Planning:

Careful planning must precede modification of an existing curriculum, the development of a novel curriculum, or even when a new course is introduced. During this process, an account must be taken of the results of the previous evaluation of the curriculum, needs identified and results of the situation analysis.

(b) Design:

In the designing of the curriculum, the following steps should be followed (Kemp in Fraser et al, 1993:105),

(i) Consider goals and give general reasons for teaching each topic listed.

(ii) Specify learning objectives in terms of measurable learner achievements.

(iii) Outline learning content related to each objective.

(iv) Choose appropriate didactic activities and teaching media to get the learning content across to the learner in order to meet the objectives.

(v) Determine appropriate evaluation strategies to determine whether students have met these objectives.

(vi) Compile study guides and other suitable learning material that will facilitate understanding of the learning content.

(c) Implementation:

After curriculum design follows implementation which is usually accompanied with the relevant training and orientation on how the curriculum is to be put into effect. For example, tutors will be trained in this regard. The curriculum is usually implemented on a trial basis and evaluated prior to final implementation when it can meet the requirements for which it was designed.

(d) Evaluation

Since curriculum development is dynamic and evaluation is an on going process, it is referred to as process evaluation. The rationale behind evaluation is to ascertain whether the aims of the curriculum are still realistic, if the appropriate learning activities have been established or whether the items in the lesson presentation are in keeping with the objectives of the lesson. The results of these findings will determine to what level development is necessary for the curriculum in question .

Thus, the curriculum serves as a masterplan for the preparation, implementation and assessment of didactic activities. In this way the practitioner can plan and structure instructional activities (van Rooy, 1990:14).

2.1.4.3 Levels of curriculum development

Curriculum development occurs at three levels, namely, macro, meso and micro level. Macro-level development occurs when the entire educational activity of a certain didactic environment is assessed. Curriculum development occurs at meso-level when an individual department or a particular subject is developed. Micro-level development takes place when the teacher plans his scheme of work for his subject or for a single lesson (Fraser et al, 1993:104).

It was important to give a definition of and discuss the concept curriculum to add focus to this study which is concerned with an in-depth look at two curricula, namely, the PBC and the traditional curriculum. A discussion of curriculum development and the factors that affect it was also necessary since this study also centres on evaluation of a newly implemented programme.

2.1.5 Models of curriculum planning

2.1.5.1 Tyler's model

This model focuses on how to build a curriculum, concentrating on four principles or questions:

(a) The first is: What educational purposes do you seek to attain? Only after having decided what one wants to teach can one select and organize one's content and teaching activities (Marsh, 1992:107).

(b) The second question is: How can learning experiences be selected which are likely to be useful in attaining these objectives? Examples of learning experiences might include not just content but also equipment set up as an experiment, slide-tape materials, readings from books, teacher-talks and so forth (Marsh, 1992:107).

(c) Thirdly, how can learning experiences be organized for effective instruction? Tyler's opinion is that a teacher has to be efficient and effective in organizing his forms of instruction. His suggestion is that learning experiences should build upon earlier activities that is, vertical organization or spiral development, and that there should be an integration of subjects, namely, horizontal organization (Marsh, 1992:109).

(d) The fourth question is: How can the effectiveness of learning experiences be evaluated? It is obviously essential to see whether the learning experiences actually achieved the intended purposes. It is important to assess student performance at various stages in the teaching of a unit and not just at the end (Marsh, 1992;109).

According to Tyler (in Curzon, 1990:137), the use of more general objectives is preferable to less general objectives. When defining an objective, two dimensions should be considered, that is, behaviour and content. Behaviour pertains to the kind of behaviour to be developed in the student. Content refers to the content or area of life in which the behaviour is to operate.

2.1.5.2 Walker's approach to curriculum planning

Walker was interested in how curriculum planners actually went

about their task rather than following Tyler's suggestions as to how they should go about their task. Walker's is a naturalistic model since he wanted to show how curriculum planning actually occurs in practice. His three step sequence of platform-deliberation-design has been used at different levels of curriculum development (Marsh, 1992:112).

(a) Platform

Individuals who meet as a group to discuss curriculum development activities, would have certain beliefs, values and perceptions of the task. The first step is, therefore to get everyone to deliberate about what the platform is or should be. This platform provides a basis for future discussions. According to Walker, a platform consists of various conceptions, theories and aims that are well formulated. Additionally, less thought out images and procedures will also exist (Marsh, 1992:113).

(b) Deliberation

This is a systematic method for formulating alternative perceptions, problems and solutions. It is through deliberation that people come up with solutions through discussions which can be chaotic and frustrating (Marsh, 1992:114).

(c) Design

The previous phase sets the stage for decisions on action. The culminating activity for the design phase is the production of specific teaching materials (Marsh, 1992:114).

2.1.5.3 The model adhered to for the purpose of this study

The PBC described in this study adopts the Tyler model for curriculum planning. The spiral development of information and both vertical and horizontal integration of subjects are important features of the PBC, drawn from the Tyler model.

The spiral development of information means that basic information is learnt first and increasingly more complex details are added later. Thus, the subject matter is constantly revisited throughout the programme and more information is mastered each time, in a spiral fashion.

Vertical integration refers to integration of subjects done from first to final year. For example, medical students will still be exposed to Biochemistry (a second year subject in the traditional curriculum), at sixth year level. Horizontal integration pertains to integration of all subjects studied in a particular year. For example, at second year level, Biochemistry, Physiology, Anatomy and Community Medicine are studied as an integrated whole.

In the PBC, behavioural objectives are considered just as much as content when defining objectives for the programme. For example, students should be able to take the blood pressure reading of a patient and not just learn the physiology of blood pressure in theory. Also, the PBC encourages on-going evaluation rather than just at the end of a course.

2.1.6 The traditional and problem-based curriculum

According to Gessner (Knowles, 1988: 98),

> "One of the chief distinctions between conventional and adult education is to be found in the learning process itself. None but the humble become good teachers of adults. In an adult class, the students' experience counts for as much as the teacher's knowledge . Both are exchangeable at par."

The format that traditionally dominated education was the study of a limited area of subject matter under the direction of a teacher who posed as an authority figure. The innovative or PBC has proved to be efficient and acceptable in the organization of learning since it is not restrained by the traditional lecture - recitation in an examination ritual. It has become a more flexible method of instruction. The traditional curriculum is centred on the transmission of content by the teacher. In PBL, the acquisition of content by the student is important, as are the skills in using knowledge (Knowles, 1980: 15).

Thus, this chapter focusses on the two curricula as they apply in general, in medicine and at Unitra.

2.2 General perspective on the traditional curriculum

2.2.1 Instructional contents

The lecturer has the task of planning the lesson which will reflect the demands of the subject area and the aims and objectives of the course. Thus, after he has selected his objectives, the lecturer collects instructional material related to the students' capabilities and achievements. Sequencing and lesson structure are established so that a series of instructional events can be planned (Curzon, 1990:240).

Marsh (1992:98) explains that sequencing pertains to the order in which content is taught. Traditional methods of establishing sequence include:

* Teaching simple skills as a prerequisite for complex skills.
* Going from generalities to specifics.
* Chronological ordering of events.
* Moving from the present to the past.

The sequencing of instruction will reflect the long and short term objectives of the course, the nature of the subject area and the perceptions of the teacher for the most effective learning procedures for his students (Curzon,1990:174).

2.2.2 Instructional activities

The lecturer is usually involved in preparing the class for an examination and therefore has to work according to a syllabus which determines his general aim and teaching objectives. Thus, he has to plan his programme of work based on predetermined objectives. Generally, those who compile a syllabus tend to follow the traditional textbook order of contents. A syllabus may be drawn up in wide terms or presented in detail, allowing little room for individual interpretation (Curzon, 1990:165-166).

The lecturer is seen in this context as the controller of the classroom since he organises a teaching strategy appropriate to students'aspirations and needs and the demands of the curriculum. He brings together the components of a learning system, namely, students, teacher,learning environment and instructional materials in order to achieve the desired objectives (Curzon, 1990:163).

The learners' abilities and level of knowledge are altered during

the process of instruction so that higher standards are attained. The predominant aspects of teaching methodology characteristic of the traditional curriculum include:

* The formal lesson in which the educator presents a learning sequence based on mastery of intellectual skills .
* The lecture, in which the lecturer presents material by means of a one-way communication process (Curzon, 1990:239).

The lecture and formal lesson is defined by Curzon (1990:239), as:

> "A self-contained instructional lesson, designed and administered by a teacher with the intention of attaining a lesson objective through guided class activities involving a variety of teaching techniques".

The lesson includes the class and the teacher who acts as the principal components of a teaching-learning system designed to transform input (class participation, performance of teacher) into output (change in level of learners' knowledge). Successful teaching will ensure that learners attain a level of knowledge superior to that likely to be reached if students were to learn on their own.

With this approach, lecturers are seldom concerned with students' ability to make judgements about what material is to be covered and to what depth, with the level of their study skills or with the processes of their learning. The myth is that those who succeed in gaining entrance in an institution of tertiary education ought to have acquired such abilities, together with the grounding in the discipline concerned (Chambers, 1992:141).

Knowles (1980: 15) states that the traditional curriculum (which is a teacher-centred, subject-based method of learning) assumes that the learner's experience in learning is inferior to that of the teacher's. What is really required of the student is that he be able to listen attentively, take notes, predict examination questions and be able to memorize information. Thus, he merely has to learn the material presented to him and be able to reproduce it in the examinations. It can be assumed that when they need to use this knowledge (i.e. after graduation), they have already forgotten it.

2.3 General perspective on the problem-based curriculum

2.3.1 Objectives

Objectives will allow faculty to be certain that the teaching methods and tools used should lead students to the desired skills and knowledge. Well stated objectives will allow students to know exactly what is expected of them. Objectives that are stated in behavioural terms describe what the student should be able to do with the knowledge acquired in the course. They specify the process of problem-solving and self-study and highlight the areas of knowledge the student is required to master in his programme- centred study. In this way, the objectives would indicate the content to be learnt in a manner which enables students to determine their own learning goals (Barrows, 1985:23).

Thus, planning of objectives must predominantly be the responsibility of the teaching staff who outline the broad framework within which the students develop their own detailed objectives. In this way students can extend their knowledge in

directions and depths of their own choice, so that objectives set by faculty serve as no more than general guides. On the other hand, students cannot be expected to play a prominent role in the strategic planning of objectives as they lack the understanding and experience for this (Walton & Matthews, 1989:548).

2.3.2 Organization of content

Content is organized by activity. The students own experience is the starting point for planning. That is to say , the students needs and interests determine the curriculum. The content is not pre-planned or pre-organized. Students use problem-solving methods to set their own tasks and skills and knowledge are acquired as they are needed. Furthermore, there are no separate subjects as such with all disciplines being studied as an integral whole (Marsh, 1992:98).

Marsh(1992:99), states that a major challenge is to ensure that the sequence selected, results in cumulative and continuous learning as the student progresses through the curriculum. In the PBC, there is a concentric movement through the curriculum with spiralling of concepts as previous areas of knowledge are revisited in different cases. Also, there is a movement from abstract experiences to concrete concepts.

2.3.3 Instructional events and activities

2.3.3.1 Small group tutorials

Small group tutorials are the predominant means by which the objectives and contents are actualized. This open climate facilitates group discussion and problem-solving and also allows

the student to determine in which areas his understanding is limited and self-study needed. This sets the basis for self-directed learning to occur (Barrows, 1985:57).

Thus, as students go through a case, they inquire, hypothesise, analyse and synthesise data. The tutor would constantly ask them to review their hypotheses and their collection of information and decide whether the hypotheses should be eliminated, reranked or revised (Barrows, 1985:68).

Barrows & Tamblyn in, Ryan (1993:57), cite that the following stages normally occur in self-directed, problem-based learning:

* The problem is encountered first in the learning process.
* The problem is presented in a way similar to how it would present itself in a professional situation.
* Students work with a problem in a manner that challenges their ability to reason and apply knowledge.
* While working through the problem, strengths and weaknesses in learning are identified and used as a basis to the identification of learning needs.
* Skills and knowledge acquired are applied to the problem to evaluate understanding of the material.
* The learning that has occurred while working with the problem and in individualised study is integrated into the student's existing knowledge and skills.

2.3.3.2 Self-study

Having generated the relevant learning issues for a particular case, the next stage is for students to engage in self-study. In order to do this students would have to consult the relevant resources, for example, text, resource faculty, and make up their

own reference notes on all the valuable information they may need. This file should be easily obtained when students need the information. Thereafter, they return to the problem loaded with new information during their individualized study for analysis and synthesis of a problem (Barrows, 1985:73-75). Thus, the structure, function, concepts and terminology of the disciplines under study need to be learnt during self-study (Barrows, 1985:80).

2.3.3.3. Lectures and demonstrations

Barrows (1985:46-47), advises that these should be considered optional enrichments for the students. They should have the choice of attending lectures/demonstrations or not. Appropriate lectures in the PBC provide a useful way of explaining difficult concepts or facts in a particular field. Lectures also provide an opportunity to talk about problems experienced, learning methods, resources and so on.

2.3.3.4 Time

Unstructured or unscheduled time is of paramount importance if PBL is to be successful. This enables the student to take time to think, problem-solve, study discuss and explore. Also, it allows for more indepth study in difficult areas (Barrows, 1985:47).

2.3.3.5 Resources

Students who go through a PBL course do not receive standard information in a predetermined, defined sequence through lectures, texts or assigned readings. Syllabi are not drawn up

and learning is not uniform but totally individualized. Students acquire information on the basis of their own self-directed study. Available learning resources enable students to acquire the relevant information when stimulated by learning issues that arise from their work with a problem (Barrows, 1985:49).

The resources for student learning has to be varied to meet the unique needs of every student. Students need to develop skills in self-directed study, as part fulfilment of the objectives, using the kinds of resources that will be available for their continued learning later in their careers (Barrows, 1985:50).

2.3.4 Evaluation

The problem-based curriculum does not enhance the students' ability to pass certifying examinations that stress recall of isolated facts. Problem-based learning requires different types of examination tools that evaluate the student's ability to work with problems and the ability to apply information (Barrows & Tamblyn, 1980: 14).

The philosophical underpinnings of the PBC which focuses on the process of learning, reasoning and information search result in evaluation being focussed on these elements rather than measuring factual knowledge only (Kaufman, 1985:147). Therefore, in the innovative curriculum, there is ongoing assessment of a variety of goals ranging from personal to programme objectives. The student is largely the main evaluator of his own progress.

The goals of student evaluation in a PBC are:

(a) Evaluation should be geared to programme goals. That is,

evaluation methods should be broad enough to provide feedback to the programme and its students to determine whether the objectives of the curriculum are being achieved by the students.

(b) Evaluation should emphasize assessment of problem-solving and application of knowledge rather than simply assessing accumulation of data.

(c) Provision should be made for formal as well as informal evaluation. Informal evaluation of a student occurs frequently enabling continuous remediation . Students evaluate their own performance in the areas of knowledge base, clinical reasoning, evaluation skills and fulfillment of a personal learning plan. They also rate all the other members in a group, including the tutor. Formal evaluation occurs at the end of a course, affording maximum feedback and opportunity for improvement (Kaufman, 1985:144-147).

2.4 A comparison between the traditional and problem-based curriculum in general

2.4.1 The structuring of knowledge

In the traditional curriculum the teacher can be assured that the student is exposed to all the knowledge and concepts that are appropriate for learning. This saves the student the agony and frustration of having to learn this information by himself (Barrows & Tamblyn, 1980: 8).

In fact, Olson (1987:295) reported that most students at McMaster University, where the PBC is implemented, attended traditional

type lectures. They stated that lectures helped them to choose and structure information. The traditional method of teaching entails following a prescribed syllabus so that information received by all students is standard and structured. Manageable portions of knowledge that are sufficient for an examination, are usually covered.

In a PBC, content is not predetermined and students learn according to their own needs. Kaufman (1985:49), asserts that in PBL, there is a range of information with emphasis on management of information appropriate to each individual and its application to problems rather than only mastery of content.

> "The true aim of the teacher is to impart an appreciation of method rather than knowledge of facts, for method is remembered when facts have been forgotten, and method can be used when there are too few facts. Students learn how to learn and can go on acquiring knowledge for the rest of their life" (Pickering in Walton & Matthews, 1989:548).

2.4.2 Financial considerations

In an era of financial constraints, decisions about educational innovations may be made more on the basis of financial than pedagogical considerations. The traditional approach to medical education is less expensive, less labour intensive and less time consuming than PBL (Mennin & Martinez - Burrola, 1986: 188).

This writer agrees with Barrows's (1986: 485) that the lecture - based learning method is the least expensive in terms of cost, time and effort for teachers. It entails less effort on the part

of curriculum designers and no special teaching skills or materials are necessary.

2.4.3 Learner-centred verses teacher-centred approach

As far as the conventional curriculum goes, the student is a passive receiver of information and does not have to make the effort to learn how to learn. He is required to regurgitate what he has been taught, on demand. The rewards students receive is external since motivation is based on examination results and not on a personal desire for fulfilment (Barrows & Tamblyn, 1980: 8).

According to Margetson (1994:11), no matter how good the lecture is, it remains a performance by the lecturer in the sense that students sit passively and hear of critical, imaginative work. Some students might be reluctant to engage actively in certain lectures and this is very disturbing.

Learning in a PBC is active and student-centred. Students are nurtured early in their training to become independent and responsible for their own education. There is no dispensing of pre-packaged information by the teacher. Students are encouraged to generate their own learning goals based on their limitations in knowledge. As they become more expert, their assessment and judgement of what they know becomes automatic and self-motivated. (Walton & Matthews, 1989:551). Indeed, the focus is on the student rather than on the teacher. The student decides what he is to learn, how he is going to learn it and whether he has mastered it properly.

Therefore, PBL allows individualization of instruction, allowing students to focus on matters they see as relevant. By allowing

students to take charge of their education with respect to direction, depth and speed, they are being treated as adults which motivates them to work harder with creativity and enthusiasm. In the case of the teacher-centred conventional curriculum, faculty is accustomed to controlling the content and organization of student learning (Kaufman, 1985:17-18).

Bruner (Knowles, 1988:89) makes the distinction between the expository mode in teaching and the hypothetical mode. In the expository mode, the pace and style of exposition is determined by the teacher , which is similar to the traditional curriculum.

In the latter approach, the student is not simply a listener but is in a more co-operative position and takes part in formulation of learning objectives.

2.4.4 Surface approach verses deep approach to learning

Margetson (1994:7) argues that the lecture typically displays a singular lack of learner activity and interaction with others. The lecture which is poorly presented will rate poorly in motivating students. Also, the anxiety of most lecturers to "cover the material" undermines a well-structured knowledge base. This surface approach to learning which manifests itself in learning without understanding, will influence graduates to continue this approach in their subsequent years and will display characteristics such as rote learning and uncritical acceptance of beliefs.

Entwistle (1992:598) writes that students sometimes focussed their revision narrowly on the lecture courses and recommended textbooks and therefore, developed an understanding which was limited to the area of knowledge defined by the lecturers. In

applying such techniques, students relied heavily on the structure for the topics provided by the lecturer. Furthermore, handouts which spoon-feed predigested information, may inhibit deep approaches to learning.

Most questions set in the final examination, seemed to demand a narrow form of understanding. Questions were presented in a way which matched the original structure of the lecture. Since many students look at previous year's papers, the type of questions set influence the form of understanding which students seek to develop. Short answers or multiple choice questions requiring factual recall push students towards a surface approach, while essay- or problem- questions encourage a deep approach (Entwistle, 1992:599).

The deep approach to learning is tantamount to learning with understanding and being able to apply that knowledge to a problem situation. Also, one is critical of what one reads and hears and instrinsic motivation is a characteristic of this type of learning. The PBC allows for a deep approach to learning in the sense that students are encouraged to discuss and debate in tutorial sessions. In order to be able to do this they need to have a thorough understanding of subject material. They are also required to apply their basic knowledge to a problem in order to be able to solve it. Students can never get away with rote memorization of information. They also display a tendency to want to master information for its own sake rather than simply for writing examinations.

2.4.5 Small group tutorials versus the traditional lecture.

The traditional curriculum is usually implemented in a large lecture room environment with large groups of students and a

lecturer. In the PBC, there are close associations with small groups of students in tutorials (Kaufman, 1985:49). In fact the lecture format in PBL is avoided as much as possible. Small group tutorials in PBL emphasize interpersonal and group skills.

Students learn to work in a team and to listen critically. They can compare their own performance and that of their peers. Tutorials also provide an opportunity for students to recognise and discuss their emotive reactions to issues such as death, religion and so forth (Kaufman, 1985:19).

The traditional curriculum as applied at Unitra in the Medical Faculty, provides little such opportunity for students. It is mainly academic matters that are covered during lectures and student-student interaction is non-existent. For that matter, teacher-student interaction seldom occurs. Thus, interpersonal skills are seldom developed in a traditional lecture. Kaufman (1985:157) states that while many students' problems would go unnoticed in the anonymity of a lecture hall, the close interaction and scrutiny of peers and tutors in a tutorial group would result in their difficulties being identified early.

Small group tutorials are more difficult to manage than a lecture because the tutor has to take a closer account of the students' behaviour, personalities and problems. In order to be successful with a small group, the tutor must have a clear understanding of how a group operates and how it develops. If he adopts an authoritarian style of leadership, he may have a lot of purposeful activity but there will be less spontaneous participation. Newble & Cannon (1986:37), advises that it is better to adopt a co-operative role where the tutor trusts that students will take responsibility for initiating discussion, providing information and asking questions.

2.4.6 Knowledge application

Students and teachers in the conventional curriculum believe that once information is dispensed, the student would internalize the information and recognise where and when to apply it effectively. Most medical students graduating fron Unitra are not given the chance to apply their knowledge until after they have graduated, when supervision is not always readily available. Additionally, they face the frustration of not knowing how to apply the information they are supposed to master.

Problem-based learning starts with a problem. Students then obtain the relevant information from various sources and apply this information for solution of the problem. This newly acquired knowledge will also be recalled and applied when a similar problem is met again in the future (Walton & Matthews, 1989:544). Furthermore, students learn information in the context of a particular problem and this information can be more readily retrieved and applied later in their careers.

2.4.7 Evaluation

With regard to the traditional curriculum, a student explained:

> "I play the examination game. The examiners play it too. The technique involves knowing what is going to be in the exam and how its going to be marked. You can acquire these techniques from sitting in the lecturer's class, getting ideas from his point of view, the form of the notes and the books he has written- and this is separate to picking up the actual work content" (Entwistle, 1992:598).

This implies that there is tension in the student's mind between learning a subject and passing the examination.

Most students who go through the traditional curriculum generally master information for examination purposes and assessment is done by faculty with no room for self-assesment on the part of the student. Also, evaluation at the end of a course is limited to defined knowledge with the objectives determined by the course designer. In a PBC, assessment is continuous and also covers the personal objectives generated by students (Walton & Matthews, 1989:555).

In the conventional programme, examinations are structured solely to test factual recall of information. In the PBC, examinations are structured to assess not only mastery of content but also self-directed learning skills, problem solving skills interpersonal and communication skills as well as knowledge application. Provision is made for formal as well as informal evaluation.

2.4.8 Integration of the disciplines

Knowles (1980: 139) state that there are advantages associated with consolidating several courses into an integrated curriculum, rather than presenting them individually. The individual course can be promoted more efficiently when it becomes integrated with other courses and it also has a greater impact on the learner. Also, an integrated programme is more flexible.

The traditional curriculum is separated into separate disciplines with different departments taking on responsibility for teaching small unconnected sections of the course. A criticism of this

approach is that students fail to appreciate the relevance of what they learn in one part of the course to other aspects of the whole curriculum (Lowry, 1993:33).

In PBL there are two approaches to integration namely, horizontal and vertical integration. In the former, boundaries between parallel points of the course are removed. In vertical integration, subjects studied in different years of a student's training, are merged (Lowry, 1993:33). Integrated courses have the advantage of encouraging co-operation between staff from different departments and avoid duplication and repetition of subject matter.

2.4.9 Time

In the traditional curriculum, the schedule is prepared by faculty and is fairly rigid. In the PBC, the schedule is unstructured. Students are mostly responsible for their own schedule either individually or in groups (Kaufman, 1985:49). The rationale is that they should be given adequate time to pursue independent study which is one of the hallmarks of the innovative programme.

2.4.10 Role of the tutor /lecturer in the traditional curriculum and problem-based curriculum

Since the main emphasis in the traditional curriculum is didactic teaching, the lecturer acts as a "middle-man" between textbook and student, sifting out relevant information to impart to the learner. Thus, the teacher shows the way rather than the student learning by self-discovery (Walton & Matthews, 1989:555).

Tutors in a PBC don't act as sole bearers of knowledge. They don't necessarily answer all the questions they are asked but appropriately throw them back to the group (Kaufman, 1985:57). If the group is really stuck and the tutor realises that not answering the question would impede further development of the discussion, he would act as a resource person and provide the answer. In the traditional programme, he would be expected to provide all answers and students are not given the opportunity or directed to find the answer.

Tutors in the problem-based track are not required to deliver the important information they feel students should have during their education, as they would in the traditional curriculum. Instead, their task is to facilitate learning, act as resource persons and evaluators of students'ability to learn and reason in a systematic way. Thus, their interaction with students is greater than in the conventional curriculum where they would spend most of their time preparing for student contact (Mennin & Martinez-Burrola, 1986:193).

Tutors in a PBC, although respected as experts in their fields, are regarded as colleagues by their students. There is equality-in -inequality. In the traditional track, they are looked up to as authority figures who will seldom be on the same level as students.

2.5 The problem-based curriculum in medical education

As regards PBL, the student takes on a patient problem as a stimulus for learning in the appropriate subjects. In this way, the student develops his problem solving skills. The educational objectives of this approach are two-fold, namely,

* to acquire an integrated body of knowledge related to the problem and
* the development of problem-solving skills.

2.5.1 The concept problem-based teaching and learning

This concept of teaching has its roots in Dewey's and Bruner's ideas on the discovery method of learning, the inquiry method, self-directed learning or problem-solving learning (Knowles, 1988: 88-89). Margetson (1994:11) explains that the process of PBL is structured so that students learn well, not simply by being told things but by learning to pursue inquiry effectively.

Knowledge of PBL is not widespread. Most tertiary educators are familiar with subject- based learning i.e. mainly lectures as the mode of teaching. Medical education has the best established examples of PBL (Margetson, 1994:9).

The educational grounds upon which to base the sequencing of content in PBL include starting from unusual, novel or complex situations and working backwards towards understanding. This is the theoretical underpinning of the innovative approach to medical education where students are faced with clinical problems early in the curriculum as a stimulus to theoretical teaching and learning (Newble & Cannon, 1986:79).

Problem-based learning demands specific formats to promote problem-solving. Schmidt (Jayawickramarajah, 1987:172), states that the sequencing and organization of health problems should capitalize on previous knowledge and should facilitate elaboration of concepts.

Jayawickramarajah (1987:172), states that content in PBL is organized :

* According to prior knowledge.
* To emphasize concepts and principles.
* To provide relevance to future practice.
* According to a problem-solving format.
* According to body-systems and/or regions.
* In order to facilitate collection and search for data.
* To make students formulate test hypotheses.

Generally, problems are chosen on the basis of prevalence, impact on the community or their importance as a model for related groups of problems. Problem-based learning could be implemented in the curriculum in various ways, namely, real patients, computerized patients and paper patients (Jayawickramarajah, 1987:51).

In PBL, the learner brings to the problem all of his previous information and expertise and his ability to think rationally about it. In the process of asking questions, certain learning issues become defined and will require a further information search. After gathering the appropriate data, he synthesises a problem solution (Neufeld & Barrows, 1974:1042).

Usually, a clinical scenario is outlined and a direct question asked. A few more clinical details are given and another question asked. Answers (or hypotheses) to these questions are modified according to clinical data or laboratory results after which therapeutic strategies are discussed (Stein, Neil & Houston, 1990:193).

2.6 The traditional curriculum in medical education

2.6.1 Teacher-centred learning

With this approach, the lecturer is solely responsible for what the student is expected to learn. He decides what content and skills the student should learn and how it is to be learnt. The lecturer is the dispenser of information and determines the syllabus to be covered. The student is not responsible for his own education. This system makes heavy demands on the lecturer because of the enormous task of ensuring that his material for lectures and practicals is accurate and updated (Barrows & Tamblyn, 1980:8). Lectures are the main method of instruction with little room for self-directed or individualized study. Even the time table does not allow for "free-periods" when students can engage in self-study.

2.6.2 Subject-based learning

With this method, learning is organized around a subject area, for example, Anatomy, Pharmacology, Biochemistry or Surgery. Learning may be organized into basic concepts that lead to more advanced concepts. The idea is for the student to have a general grasp of the subject area involved and to apply his understanding of each subject field to the care of patients. It is assumed that the student would apply the knowledge acquired to a clinical problem. Thus, the various subjects are studied in isolation and are not integrated. Examinations test the ability of students to master information metered out by the teacher (Barrows & Tamblyn, 1980:11).

2.7 Comparison between the problem-based and traditional curriculum in medical education

2.7.1 Relevance and application of knowledge

Frustration among students is well known in the pre-clinical years when basic knowledge is unrelated to clinical practice (Margetson, 1994:12). One cannot predict which aspects of information the student has learned, will eventually become obsolete or incorrect, or what new information he would need to know in the future. The disadvantage of the traditional curriculum is that the student has not learned to learn so that he could discover new knowledge (Barrows & Tamblyn, 1980: 9).

Gonella, Goran Williamson & Cotsonas, in Schmidt (1983: 11) found that doctors of a large general hospital were in 50% of cases unable to perform critical screening activities on patients suspected of having pyelonephritis. The same group, however, achieved a mean score of 82% in a multiple-choice question test. Schmidt (1983:11) maintain that people can possess knowledge but may be unable to apply it. The conventional instructional procedure does not always enable students to make appropriate use of that knowledge.

Does PBL really promote the acquisition of knowledge that is applicable? Research done by Schmidt (1983: 16) suggest that a PBC may provide better opportunities for learning to solve medical problems. Small groups of students analysed a written problem on osmosis. Thereafter, they studied new information relevant to this topic. When compared with control subjects that only studied the text, the experimental group were better at using information from the test in order to solve small problems.

Elango et al. (1991: 65) have stated that the use of clinical problems emphasizes the relevance of learning basic sciences. The knowledge acquired is put into long-term memory more effectively and is easily recalled in a clinical situation.

Walton & Matthews (1989: 544) state that an advantage of PBL is learning how to obtain information from various sources. Students also learn how to convey information and how to obtain feedback on how well new learning has been assimilated. Mitchell (1988:57), state that PBL recognises that gaining knowledge is different from use of knowledge and that learning and application of facts is unique for every individual.

Since his learning is centred around patient problems, the student would be able to appreciate the relevance of what he has to learn, more especially the importance of basic science information, to his future tasks. The problem-based curriculum will impart skills that will still be useful in the student's professional life (Barrows & Tamblyn, 1980: 13).

From this writer's experience, the most distinct advantage of PBL is that it brings out the relevance of the basic science subjects (Biochemistry, Anatomy and Physiology) to the clinical situation. Thus, it helps to put these subjects into a clinical context and students can readily appreciate why they need to know a certain bit of information. Furthermore, the PBC has proved to be most stimulating, interesting and enjoyable. There is always something new to be learnt, and it has provided a good challenge.

2.7.2 Learning in a clinical context

According to Glaser, in Barrows (1986: 481) education is most effective when it is undertaken in the context of future tasks.

In order to facilitate recall and application of information from the basic sciences to future clinical cases, learning should occur in clinical contexts. This will ensure that knowledge will be structured to support practice.

Barrow & Tamblyn (1980: 13) continue in the same light by asserting that "this approach is tailor-made for medicine". Information learned by the student is internalized into his memory, in association with a problem. This enables him to recall the appropriate information more readily when a similar problem presents itself. Also, recall is reinforced by subsequent work with other problems. The student is in a position to use the problem as a focus for the study of various subjects, integrating this information so that it can be applied to the immediate problem as well as to subsequent problems.

Information acquired in the traditional curriculum does not occur in a clinical context and is rapidly lost to memory. Most students cram information into their memory to pass an examination but long term retention is poor. If they do remember some information over time, it is not structured or organized for clinical work and is less likely to be recalled with clinical cues since it was not learnt in the context of clinical thinking (Barrows, 1985:101).

2.7.3 Problem-solving

The hypothetical model (see 3.1.1) leads to self-discovery by the student and it shifts from extrinsic to intrinsic rewards. Students learn the heuristics of discovery and it makes material more readily accessible to memory. Bruner, in Knowles (1988: 89) states that this mode is more congruent with and more likely to nurture the will to learn.

With this approach, the student is compelled to develop problem-solving, diagnostic or clinical reasoning skills. He must get information, synthesize the data available, develop hypotheses and apply deductive reasoning to the problem at hand. This challenges and motivates students since they are faced with the very situations they will be confronted with in their professional field (Barrows & Tamblyn, 1980: 13). Also, problem-solving skills developed in association with the acquisition of basic science and clinical information will ensure that problem solving and knowledge will work synergistically in the clinical setting (Simone, in Barrows, 1986: 482).

Once students have become successful problem solvers,

> "they can go forth and tackle problems of all sorts, from carpentry to cardiology, confident that they have the mental faculties to arrive at a successful conclusion" (Norman, 1988:279).

In this respect, Mitchell (1988:58), lists three disadvantages of the problem-based curriculum:

* The creation of suitable problems is difficult.
* Problems are not comprehensive and students may become certified without an appropriate knowledge base and
* The method is inefficient since students do not have the knowledge and skills initially, to solve problems and tutors do not have the skills to guide them.

2.7.4 Interpersonal skills

Margetson (1994:11) states that PBL makes active student participation typical during class meetings. It provides

opportunities for interaction, dialogue, discussion and the sharing of relevant knowledge and experience. Problem-based learning also makes systematic use of peer tutoring and encourages co-operation, responsibility and good interpersonal skills.

The traditional lecture where large numbers of students meet with a single lecturer is not conducive for the establishment of good interpersonal skills or co-operative learning. A whole year may go by and students would barely know their classmates nor would the lecturer get to know his students on a one-to -one basis.

Also, the competition that exists between students for top place in the traditional examination is discouraged in the PBC where co-operation is emphasised. The bad influence of such competition is that it could possibly discourage a good team spirit and limit the extent of co-operative learning. This is to prepare students for the workplace where they are more likely to work with colleagues rather than compete against them .

2.7.5 Motivation

The fundamental objective of PBL is to accumululate the concepts of medicine in the context of a clinical problem. Also, the "paper patients" created by PBL has a bearing on students motivation-they enjoy the doctoring game (Norman, 1988:282).

Another advantage is that this method is more enjoyable and rewarding. Students become excited, motivated and exhibit more mature behaviour since they are treated as self-determining adults. They inculcate secure clinical reasoning and learning

skills and acquire the relevant basic knowledge (Barrows & Tamblyn, 1980: 13). Margetson (1994:11) endorses this view of increased motivation in students who are exposed to PBL by saying that active student participaton encourages learning through motivation.

> "Students learn for personal not teacher dispensed rewards" (Mitchell, 1988:57).

According to Neufeld & Barrows (1974:1042), the advantage of PBL is that it contributes to the student's motivation and it encourages active, intellectual processes at the higher cognitive level. Furthermore, it probably enhances the retention and transfer of information. It can be modified to meet individual student needs and it encourages curiosity and systematic thinking.

While students in the PBC exhibit intrinsically motivated behaviour, their counterparts in the conventional track are more likely to be extrinsically motivated if at all they are motivated. Students learn for teacher-dispensed rewards and the main thrust in their educational aims is to gain top marks in the examinations.

Frustration sets in when students are forced to master information that is sometimes irrelevant for a medical student. They also have no choice in the content they have to study. It is not uncommon for students to wonder why they have to learn certain concepts as they don't see the application of that information to clinical work. In this author's opinion, this could have a demotivating effect on students.

A quotation in Kaufman (1985:1), by medical students who see their coursework as more of a hurdle than an educational adventure, explains their feelings rather succintly:

> "I don't see the point of all this material they're throwing at us. They don't connect it with patients or any real problems. But I'm not going to make waves. I'm just going to get through."

2.7.6 Competence of students

According to Elango (1991: 63-66), medical students who graduated, having gone through the integrated PBC, have certain advantages over those trained in the traditional curriculum. The reasons given for this is that the use of clinical problems emphasize the relevance of learning basic sciences, and its immediate use reinforces the learning process.

Also, the knowledge acquired is put into memory and more easily recalled. If the student is exposed to a patient, he has reasonable skills to examine the patient and arrive at a suitable diagnosis far earlier than a student exposed to the traditional curriculum. In the event of them lacking the knowledge to solve the problem, they can easily rely on their self-directed learning skills to search for and find that knowledge.

Small (1988: 848-853) maintains that the introduction of clinical material into the teaching of basic sciences is not simply to motivate the students, but is important because of its usefulness to the future physician. The integrated curriculum, because of its inter-disciplinary teaching programmes, enables medical students to appreciate the normal and altered function of the

body as a whole and not as a series of separate compartments (Harden, 1988: 129-131).

Students who go through the conventional curriculum might have a greater basic knowledge base than those in the PBC but their ability to apply that information to a clinical case is limited. Learners who are exposed to PBL are presumably better able to analyse a clinical case and apply their understanding of the basic sciences.

Claessen & Boshuizen (in Schmidt et al,1987:309), compared the performances of students from two medical schools in the Netherlands. One school adopted the traditional curriculum while the other followed the PBC. Students were tested on patient cases and were given information about the patient and then asked to recall as much information as possible. The authors concluded from their study that students in the PBC were able to recall more information than students in the conventional programme. They attributed these findings to the fact that students in the PBC had the available cognitive structure that enabled them to possess patient data in a better way than their counterparts in the traditional curriculum.

2.7.7 Self-directed learning

Whether PBL is successful or not, will depend on how disciplined the students are to engage in self-directed learning. Furthermore, tutors need to have the skills necessary to guide students in this process (Barrows & Tamblyn, 1980: 14).

Students in problem-based curricula do not always reach levels of academic achievement comparable with those students in

conventional curricula (Schmidt et al. 1987: 313). Entwistle (1992:603) claims that the limitations of PBL is created by the

> "patchy nature of disciplinary inputs within a case study framework".

The problem-based method stresses the clinical aspects of patient care, at the expense of the basic sciences. Barrows & Tamblyn (1980: 14) go on to say that, if correctly implemented, this approach will stress problem solving skills and not the acquisition of knowledge. This need not be the case, though, as the challenge should not be the diagnosis of the problem, but in understanding the Anatomical, Biochemical or Physiological learning issues involved in the problem.

Additionally, self-directed learning skills, enable the student to become aware of personal learning needs and to locate and make use of appropriate information sources. These are essential skills for doctors who have to keep up with changing medical knowledge and new patient problems never envisaged by medical teachers (Barrows, 1986: 482). Problem-based learning teaches students the skill of solving familiar as well as novel problems (Mitchell, 1988:57).

Margetson (1994:16) cites that

> "the structure and process of PBL is open and encourages self-directed learning and group work systematically and in an increasingly coherent experience of educative learning".

Furthermore, PBL embodies critical thinking and in so doing, opens the curriculum by considering whatever is needed in

tackling problems. Qualities such as openness, self-directed learning, group work, critical evaluation and assessment are integral to PBL.

The traditional curriculum leaves little room for self-directed learning. The lecturer usually decides what the main purpose of the lecture is going to be, what methods he will use to dispense this information and what resources will be utilized. He also decides how he is going to structure the content and how much to cover in his lecture period. He is expected to assume that his students have no prior knowledge of his subject (Newble & Cannon, 1986:5). Additionally, students have no say in setting their objectives depending on their learning needs. They seldom do extra reading outside the realm of the lecture material since this is adequate to pass examinations.

In order to encourage good patient care, the main thrust of the PBC is to help students acquire attitudes, knowledge and abilities necessary to identify, analyse and manage clinical problems and to remain life-long learners (Olson, 1987:293-296). Even Bligh (in Newble & Cannon, 1986:3) who argues that the lecture is as effective as most methods in transmitting information, states that it is less effective than other methods for promoting thought or changing attitudes.

2.7.8 Student learning styles-deep approach versus surface approach to learning

The surface approach is characterized by rote learning aimed at reproduction of information and extensive memorization. Students do only what is required by the course. The deep approach is amenable to integration of what one learns to what one already knows in order to understand the meaning of data to be learnt (Schmidt et al, 1987:311).

Deep approaches to learning may be fostered by crucial conditions such as motivational content, learner activity , interaction with others and a well structured knowledge base. All of those are characteristics of PBL (Gibbs in Margetson, 1994:7). On the other extreme traditional methods of teaching, for example, the lecture, shows lack of learner activity, rates poorly in motivating students and interaction with others. Thus, it is predisposed to generating surface approaches to learning (Margetson,1994:70.

Furthermore, the application of peer learning (a learning process in which learners learn from their peers), is consistent with the PBC. The peer learning process, namely, problem-solving, brain-storming, peer evaluation, group discussion with peers and observation of peers, may facilitate deep learning. Deep learning is necessary for students to apply theory to clinical situations in an appropriate way and therefore, forms an important part of educational experiences, especially for the adult learner (Lincoln & Mc Allister , 1993: 18-19).

2.7.9 Lack of preparation time

Another concern is that PBL seems to be an inefficient way to learn. When a new problem is being tackled, the student requires a great deal of time to be familiar with and understand the terminology, the significance of symptoms or signs, and the basic Anatomy, Biochemistry and Physiology of the organ systems involved (Barrows & Tamblyn, 1980: 14).

Other disadvantages cited by Pinto Pereira et al. (1993:357) are lack of preparation time for staff and students as well as poor management of group dynamics by inexperienced tutors. This serves to mitigate against full student participation.

The above authors then contradict this by saying that there is little inefficiency involved since this study provides the factual foundation for understanding subsequent problems, thus continually reinforcing what he has learnt.

The learning events in the traditional curriculum are structured and scheduled. Lectures which are the predominant form of instruction in this type of curriculum provide students with an overview of putting across difficult concepts or facts in a particular field (Barrows,1985:46). This saves students' time and frustration in trying to find and understand the information themselves. Also, students in a traditional curriculum do not necessarily need to prepare for a lecture since they are passive listeners. In the PBC, it is imperative that students engage in intense study prior to attending tutorial discussions in order to be active participants. This activity is very time consuming.

2.7.10 Clinical reasoning process

Neufeld et al. in, Norman (1988:280) criticises the clinical reasoning process used in PBL by stating that the process has "some very unskill-like characteristics". Students, even in their first year at medical school, use exactly the same process. Therefore, if it is a skill, it is not learnt in medical school (through the PBC).

In support of the clinical reasoning process, Walton & Matthews (1989:547), argues that when doctors are presented with problems they usually start without the necessary data to evaluate and solve them. The patient presents his illness with pieces of information; the rest of the information needs to be obtained in order to discover what is going on. The doctor then determines

what information is going to assist in achieving a solution. Students in PBL are in a position to develop these inquiring skills earlier in their careers than those taught by the more traditional methods.

Of students in the traditional curriculum, Ramsden (in Margetson, 1994:7), succintly states that there is evidence of inadequate skills in working co-operatively to solve problems. Students also exhibit overdependence on teachers for information and lack the ability to assess their own limitations in knowledge which is the only true precursor of further inquiry. In this regard, standards attained by graduates is unsatisfactory.

2.7.11 Inexperience and insecurity

Mitchell (1988:64) also reports that the greatest problem (which they see as a disadvantage) experienced by students at The University of Witwatersrand Medical School, is that of insecurity. Another problem derives from actual teacher training. Professional scientists, lacking clinical experience, are inclined to promote "intrinsic scientific values" rather than providing the vocational training pertinent to medical students.

Thus, the important features of the PBC are problem-solving, self-directed, student-centred learning, clinical reasoning and small group tutorials. The distinguishing features of the traditional curriculum, on the other hand, are traditional leatures which are teacher-centred and content orientated. While the PBC in medical education relates basic science knowledge to clinical information, in an integrated way, the traditional curriculum is disciplined based and concentrates only on the basic sciences or only on clinical subjects, at one particular time.

2.8 Advantages and disadvantages of the PBC in medical education

2.8.1 Advantages of the problem-based curriculum

2.8.1.1 Student-centred learning

Problem-based learning is advantageous in the sense that students are required to engage in self-directed study and obtain information from various sources in addition to learning how to convey information and receive feedback (Walton & Matthews, 1989:544). A student-centred approach is thought to enhance learning by de-emphasizing what is taught and concentrating on what is actually learnt. It is good preparation for continued, life-long learning (Lowry, 1993:29).

2.8.1.2 Relevance

In PBL, students can relate basic science information to clinical cases and in this way will see the relevance of their education to future tasks in professional life (Barrows & Tamblyn, 1980;13). Also, education occurs in a clinical context making recall and application of basic science information much easier (Glaser in Barrows, 1986:481). Problem-based learning encourages intellectual processes at the higher cognitive level (Neufeld & Barrows, 1974:1042).

2.8.1.3 Problem-solving and clinical reasoning skills

The PBC compells students to develop problem-solving and clinical reasoning skills. This motivates students since they are faced with the very situation they will confront as doctors (Simone in Barrows, 1986:482). In the PBC, they are taught how to care for

patients and solve their problems which is the major objective of medical education (Schmidt et al, 1987:308).

2.8.1.4 Interpersonal skills

Problem-based learning also enables students to interact more co-operatively, especially during tutorials when they can engage in dialogue, discussion and sharing of knowledge. In a study done by Mennin & Martinez-Burrola (1986:193), teachers claimed that they valued their personal interactions with students in the PBC. Students and tutors interact as colleagues and a hierachy of status is non-existent.

2.8.1.5 Approaches to learning

The PBC exposes students to approaches to learning which are comensurate with the deep approach to learning. Characteristics of a deep approach to learning include learning to understand and being able to apply knowledge as well as to look for explanations rather than facts (Schmidt et al, 1987:311). Indeed, PBL emphasises process rather than memorization of content and understanding of knowledge is essential if one has to use it to solve a problem.

2.8.1.6 Integration of the disciplines

Problem-based learning fits in well with integrated approaches to learning. Basic science subjects are integrated and studied as a whole as they are related to various aspects of a problem (Lowry, 1993:30). Traditional boundaries between subjects disappear and students can appreciate the relevance of what they are studying.

2.8.1.7 Community-based teaching

The problem-based curriculum incorporates community-based teaching of which the perceived advantage is that the students see patients in their own environment and obtain a clear picture of how illness affects all aspects of a person's life. Students also learn about how health services are provided and the importance of a team approach (Lowry, 1993:35).

2.8.1.8 Motivation

Problem-based learning motivates students since they are treated as responsible adults in charge of their own learning. Most students enjoy the excitement of self-discovery (Walton & Matthews, 1989:551). Students feel that they are in the "driver's seat" when they are allowed to interact with patients and solve clinical problems. They have a feel of what it's like to be a doctor and this motivates them and allows a sense of responsibility to flourish. Progressively, students' behaviour will mirror that of the doctors' (Walton & Matthews, 1989:549).

2.8.2 Disadvantages of the problem-based curriculum in medical education

2.8.2.1 Time

The initial planning required for the appropriate sequencing of content for cumulative, progressive learning through PBL, is difficult and time-consuming. The setting of clearly enunciated objectives from colleagues of different disciplines demands time and patience (Walton & Matthews, 1989:533). Students require a great deal of time to go over a single clinical case as well as

to gather the necessary data to solve the problem (Barrows & Tamblyn, 1980:14).

2.8.2.2 Tutors

Most lecturers or tutors are inexperienced and unacquainted with the task of facilitator in the PBC, Many have experience in the traditional way of teaching and have to be taught how to teach in the novel curriculum. Another constraint for some tutors is that they may find it difficult to teach an integrated course and some may become demotivated if they do not feel they are teaching their own subject (Lowry, 1993:34).

From this writer's experience at Unitra, the above problem is very real. Lecturers were trained in a particular field, for example, Anatomy. To facilitate the learning of Physiology and Biochemistry meant they had to learn two new subjects which often posed a challenge. Therefore, staff were more comfortable teaching their own subject areas because of their greater knowledge in that particular field.

Walton & Matthews (1989:552) cite that many attempts at PBL are unsuccessful because of inadequate tutorial skills. Some teachers may even show resistence to the novel way of teaching and learning.

2.8.2.3 Frustration and insecurity

Students feel they are being used as "guinea pigs" in an educational experiment. They have not been through this type of curriculum before which demands of them to be responsible, independent, self-determining adults. When deprived of the

external support they were accustomed to in the traditional curriculum, students experience a sense of anxiety when required to carry out learning tasks. Their major complaint is that learning through a problem-based approach, deprives them of a comprehensive view of the disciplines (Walton & Matthews, 1989:552). In addition to this, assessments in the PBC is more on performance than simply knowledge, which is why students find examinations more stressful.

2.8.2.4 Student-centred learning

This approach to learning can be difficult to co-ordinate and administer. Most tutors have not been trained to facilitate student-centred learning and if students are not familiar with how to direct their own learning, they can be left aimless and floundering (Lowry, 1993:29).

2.8.2.5 Community-based education

Community based education is usually run together with PBL. A major problem in this regard is that students must learn in small groups and there are numerous logistic problems in arranging adequate accomodation, transport and support services for students when they are scattered away from the medical school (Lowry, 1993:35).

2.9 The traditional curriculum at Unitra

2.9.1 Lectures

The main method of instruction was the traditional lecture where the lecturer dispensed information and the student was a passive

receiver of this information. Students received handouts and also made their own lecture notes. There was always pressure on the lecturer to finish the prescribed syllabus and questions during lecture times were not always welcome. There was little oportunity to discuss, debate and exchange ideas.

2.9.2 Lecturers

Students in the preclinical years were mostly taught by non-medical staff who usually tried to promote their own subjects because they saw it as being separate and part of the whole curriculum. Students' exposure to medically trained people was limited and only occurred after three years. Thus, students in their early years of training seldom had role models.

2.9.3 Content

In the traditional curriculum, there was emphasis on content to be covered rather than techniques of self-study or problem-solving. The sequencing and arrangement of content usually followed a textbook pattern of instruction. Knowledge in each discipline was clearly and rigidly structured. At the beginning of the year, students would be given a list of the topics to be covered and during the course of the year lecture notes would be distributed. In the preclinical years, it was mainly basic science information that was covered and this was not related to clinical cases. Much of what was presented to medical students was irrelevant to what a doctor ought to have known.

2.9.4 Methodology

Discipline based teaching was predominant when the traditional curriculum was in force. At second year level, Biochemistry,

Physiology and Anatomy were taught separately by different departments and information in these subjects were unconnected and unrelated to clinical aspects.

For example, if a section on the gross Anatomy and Histology of the pancreas was being taught by the anatomist, there would be no immediate follow up on exocrine and endocrine secretions of the pancreas by the physiologists and biochemists. Each would be studied in isolation at different times and it would be assumed that students would make the connection by themselves. Also, the role of pancreatic cells in diabetes would only be dealt with in subsequent years of a student's training by which time he may have already forgotten his second year knowledge. Therefore, students failed to see the relevance of what they learnt in one course to other parts of the curriculum.

Additionally, since members of staff from different departments did not know what the others were teaching, duplication and repetition of subject matter was evident. Each head of department had territorial powers over his department enforcing his personal beliefs and attitudes in the implementation of the curriculum.

2.9.5 Time

The timetable was clearly structured by faculty with every hour of the day accounted for. There was no free time or unstructured part of the day when students could engage in individual study.

2.9.6 Examinations

Separate examinations were held for the different disciplines viz. Biochemistry, Physiology and Anatomy. Assessment comprised

the content examination, oral examination (Physiology and Biochemistry) and the practical examination (Anatomy).

Students were forced to accept information uncritically and often memorized lecture material for the examinations. Generally, students had a great deal of factual knowledge and were able to answer adequately, examination questions that required regurgitation of information. The pass rate was good and students felt secure.

2.10 The problem-based curriculum at the University of Transkei

2.10.1. Tutoring

The innovative curriculum introduced at Unitra involves self-directed learning in small groups and is mostly student-centred. A clinical problem forms the basis of study and allows for the generation of hypotheses and learning issues. Biochemistry, physiology and anatomy are studied as an integrated whole. Students study the relevant learning issues on their own and discussions are held during tutorial sessions. This method of learning draws on the previous experience of the adult learner.

2.10.2 "Lectures"

Generally, students have responded well to the novel way of self-directed learning although some do encounter difficulties because they have to engage in more disciplined learning. "Lectures" or discussions are only given on certain difficult aspects of the syllabus which are requested by the students. Every week a student representative from each group as well as faculty, meets to discuss any difficulties experienced with respect to a recently completed case study.

2.10.3 Examination methods

This involves a content examination, individualised process assessment (IPA), an objectively structured clinical examination (OSCE) including an ongoing evaluation during tutorials. More information on evaluation methods used in the innovative curriculum is given in Chapter 3 (see 3.4.3).

2.11 A comparison between the traditional and problem-based curriculum at the University of Transkei

2.11.1 General observations

At Unitra, faculty have found the following:

(a) It is very difficult to formulate clinical problems for different cases especially if they are to cover the three basic science subjects adequately. Generation of these cases is very time consuming.

(b) Problem-based learning is very costly. The faculty Library has to be well stocked to fulfil the aim of the program, namely, self-directed study. There is a need for a resource centre to provide teaching materials. Since the implementation of this curriculum is so labour intensive, more staff have to be recruited.

(c) The PBC is time consuming. More time is needed to complete the curriculum adequately, and the academic year may have to be extended. This will be tiring and stressful for both tutors and students. Form the tutor's point of view, there is little time to do anything else, namely, to engage in research or further study.

(d) There was a lack of sense of purpose and confusion initially experienced by the students which is similar to the experiences of students at other medical schools as described by Walton & Matthews (1989: 552).

2.11.2 Tutor perspectives

This writer disagrees with Mennin & Martinez-Borrola (1986: 193) who state that, since lecturers serve as facilitators of the learning process in the PBC, there is less time spent in preparation for tutorials. From personal experience, this is not the case since tutors have to have a thorough understanding of three subjects, namely, Anatomy, Biochemistry and Physiology, to be able to facilitate the learning process efficiently. This is compounded by the fact that tutors have to apply this knowledge to a clinical case. Therefore, lecturers have to undergo intensive training themselves in order to be good tutors. This has resulted in tutor burn-out which was never experienced before with the traditional curriculum.

2.11.3 Curriculum development

Lecturers at Unitra did not have to be trained to teach in the traditional curriculum as this was the way they were taught themselves. When the PBC was introduced, these lecturers had to undergo training to learn how to tutor in the novel curriculum. Their roles had changed from lecturer to facilitator of the learning process. Furthermore, more staff had to be recruited as more people were required for tutorial-based instruction.

Also, there were fewer resources that were required in the traditional curriculum. A large lecture hall was sufficient to

accomodate all students for lectures and not many textbooks were needed as the lecturer was the main source of information. The inception of the new programme demanded upgrading of teaching-learning facilities and resources. For example, new rooms for tutorial sessions had to be made available and textbooks had to be purchased to make individual study a practical possibility. Thus, a media centre had to be established.

The PBL method requires complex problem simulations for teaching and evaluation which take time and effort to prepare. Also, the curriculum has to be thought out in terms of objectives, choice of problems, scheduling of time and development of sources (Barrows, 1986: 485).

At Unitra, the entire sequence, organization and selection of content of the curriculum had to be revamped when the PBC was introduced. Clinical case studies had to be carefully selected and drawn up since they formed the basis of teaching and learning. Students start from a problem situation and work backwards towards understanding. Also, new objectives had to be elucidated because the traditional ones were no longer valid for the novel programme. Even the time table underwent changes to allow free time for self-study.

2.11.4 Peer pressure

What is noticable at Unitra is that the problem-based curriculum enforces a sense of responsibility for learning and there is peer pressure among members of the group to complete learning tasks.

Those who feel they can get away with not doing their work are soon made to feel embarassed by those who study hard. In the

conventional curriculum, there was no such pressure since there is little interaction between students on a didactic level. Students who did not know their work and who would sit passively in a lecture would go unnoticed by the lecturer and their peers.

2.11.5 Interpersonal relationships

While the traditional curriculum did not foster in Unitra students the will to communicate with and get on well with fellow students, the PBC certainly does. Six to eight students who meet regularly on a weekly basis for a whole term, soon form a bond with each other and with the tutor. Also, group study teaches students that one may not relate particularly well to a person one has to work with , but one has to learn how to deal with the situation.

2.12 Which approach is more feasible?

2.12.1 Application of knowledge

Evidence for the effectiveness of PBL has been in the literature for some time. Research was conducted by Barrows & Tamblyn (1976a:52:54) to determine the effectiveness of problem-based, small group learning on a group of students within a more traditional curriculum as compared to a similar control group. It was found that the experimental group showed increased skills in problem formulation and self-study. They also had greater motivation to seek clinical experience on their own.

According to Barrows & Tamblyn (1980: 5), most educators in the medical field are too preoccupied with the delivery of content to ensure a sound knowledge in the basic sciences. They don't

deny that this is important but maintain that its relationship to the purposes of a medical education is distorted.

The acquisition of a large store of knowledge in the basic sciences is no guarantee that the student would know how or when to apply this knowledge in the care of patients. A consistent clinical competence, however, would ensure that he has an adequate grasp of the basic sciences (Barrows & Tamblyn, 1980: 6). Thus, the emphasis in medical education must be on the application of knowledge.

2.12.2 Knowledge in context

Also, knowledge is much better remembered or recalled in the context in which it was originally learnt. For example, if you meet a student in the grocery store (an unfamiliar context) you might have difficulty remembering his name. If you meet the same person at university, there will be no such difficulty.

The task of the clinician is to apply his knowledge and skills to the solution of a patient's problem. Therefore, it makes sense to learn the prerequisite knowledge in the same context, that is, in the context of a patient's problem (Norman, 1988:283).

A comparison of a PBL school, Maastrict, to a conventional school in the Netherlands showed that students in the PBL curriculum were better able to recall information in the context of patients' problems (Claessen & Boshuisen in, Norman, 1988:283).

2.12.3 Self-directed, life-long learning

According to a report on improving the quality of medical education by the Association of American Medical Colleges'

Project Panel (Schmidt, et al, 1987: 305) medical schools offer education that requires students to be active, independent learners and problem-solvers rather than passive recipients of knowledge.

Additionally, the main objective of medical education is the ability to care for patients and solve their problems. Of what use would encyclopedic information be to a doctor who does not have the problem-solving skills necessary to apply that information in the care of patients? (Schmidt et al., 1987: 308)

Knowles (1980: 16) stated that medical students are expected to develop:

* the ability to evaluate and manage patients with medical problems, efficiently (clinical reasoning skills); and
* the ability to define the needs to keep his skills contemporary with his chosen field and to care properly for the problems he encounters (self-directed study skills).

Doctors should be trained by encountering and solving problems which they will face in professional life. Problem-based learning promotes proper methods for learning and provides a basis for lifelong learning. It also provides systematic training in solving problems (Wolff, 1979:396).

2.12.4 Problem-solving

The conventional curriculum on the other hand, makes little provision for differentiating patients' problems, clinical reasoning decision making and diagnostic treatment. In PBL, the problems selected serve as a basis for the initial step in the learning sequence. Although the entire subject can never be covered, the emphasis is on the techniques of problem solving (Wolff, 1979:396).

2.12.5 Approaches to learning

Marton in, Chambers (1992:142) developed a conceptual distinction between deep and surface approaches to learning. The deep approach refers to learning motivated by the desire to understand and is characterized by an enquiring, critical stance. The surface approach passive, motivated by the desire to complete tasks and is characterized by lack of reflection, memorization and reproduction of unrelated facts and ideas for examination purposes.

According to Entwistle (1992:603) the PBL would encourage a deep approach to learning since it pertains to active lifelong learning by the students. Students are also encouraged to adopt an enquiring approach to their learning. The traditional curriculum would cause students to adopt a surface approach to learning.

The deep approach is synonomous with:

* the intention to understand material for oneself,
* interacting critically with content,
* relating ideas to previous knowledge and experience,
* relating evidence to conclusions and
* examining the logic of the argument.

The surface approach refers to :

* the intention to reproduce parts of the content,
* accepting ideas and information passively,
* memorizing facts,
* concentrating only on assessment requirements and
* not reflecting on purpose strategies in learning (Marton & Salijo; Entwistle & Ramsden, in Entwistle, 1992:598).

2.13 Summary and conclusion

A curriculum is a blueprint for the planning, implementation and evaluation of teaching/learning activities and processes. This blueprint is drawn up on the basis of the aims which emerge from the results of a situation analysis. The aims of the curriculum determine the sequence, arrangement and choice of content which in turn determines the methodology of instruction to be used to ensure that the objectives are met. Evaluation is conducted to ascertain whether the aims and objectives of the curriculum have been realized and to what extent the methodology used has resulted in successful teaching and learning. Therefore, each aspect of a curriculum is interrelated and operates synergistically with each other.

In the traditional curriculum, the lecture is the main method of instruction and the aim is to cover a predetermined syllabus within a certain time frame for reproduction in the examinations. In this teacher-centred curriculum, the student is a passive receiver of information in a lecture situation where the lecturer is the sole bearer of knowledge. The student in the conventional programme has no say in the design of the curriculum. Faculty has complete power in compiling aims and objectives, deciding what content is to be covered, in what sequence and at what pace. The traditional curriculum is also discipline based with students studying each subject separately and writing separate examinations.

The PBC focuses on cultivation of techniques and attitudes to learning that are needed to keep up with ever increasing knowledge. To this end, self-directed learning skills are inculcated as are problem-solving skills. There is emphasis on

student-centred learning with students taking on much of the responsibility for defining the objectives of the course, the course content, the learning resources and teaching methods to be used as well as the pace of teaching and methods of assessment. The introduction of a PBC means development of new methods of student assessment to test all desired knowledge, skills and attitudes. In the innovative curriculum, there is an integration of all the disciplines so that the curriculum is seen as a whole and not as a sum of its parts. In medical education, there is an integration of preclinical and clinical teaching by redesigning the curriculum as a continuum.

The traditional curriculum at Unitra, like most universities, saw the lecturer being the sole bearer of knowledge. Structured information according to a prescribed syllabus was metered out to students. This knowledge had to be mastered for reproduction in the examinations. Application of knowledge to clinical cases, at second year level was seldom enforced. There was little opportunity for group discussions, save for the tutorial sessions. Also, students did not have to learn how to interact well on an interpersonal level. This curriculum was more teacher-centred with no emphasis on self-directed learning.

The main feature of the traditional curriculum, which stands out as being different from the PBC, is heavy workload, excessive amount of course material, little opportunity to pursue subjects in depth, little choice over topics or methods of study and an anxiety provoking assessment system that rewards or tolerates regurgitation of factual information. This results in students adopting a surface approach to learning (Lowry, 1993:27).

Also, traditional medical schools tend to concentrate on teaching facts which doctors then have to apply when required to tackle the problems faced in clinical practice. The major hallmark of the PBC is PBL. The idea behind PBL is that students are presented with a clinical problem and use it as a springboard from which to explore various topics. Problem-based learning fits in well with the integrated approach in which students study different aspects of a problem simultaneously. It is also amenable to self-directed study where students choose the relevant learning issues in order to solve a clinical problem.

Any curriculum is always in flux and never static. A curriclum has to change to meet the changing needs of society. The results of a curriculum evaluation will determine what changes would have to made. One way of evaluating a curriclum is to conduct a study of student perceptions towards the curriculum since they are the ones most directly involved in its implementation.

Since this study focuses on the perceptions of Unitra students towards the traditional curriculum and the PBC, this chapter covered aspects pertaining to the conventional and recently implemented PBC at Unitra in an attempt to put the aims of the study into perspective. To some degree it also forms the basis for Chapter 3 which discusses the implementation of the PBC at Unitra in greater detail.

Therefore, having discussed the traditional and problem-based curriculum in general, at Unitra and with respect to medical education and compared them, the following chapter focusses on how the innovative curriculum is run at Unitra, in greater detail. Additionally, what is studied, how it is presented, and who is involved, will receive coverage. The problems encountered and the benefits visualized with the novel programme will also be discussed.

CHAPTER 3

IMPLEMENTATION OF THE PROBLEM-BASED CURRICULUM AT THE UNIVERSITY OF TRANSKEI

In the previous chapter, the concept curriculum on a general basis was discussed, as was the PBC and the traditional curriculum. In this chapter, the actual implementation of the novel curriculum at Unitra will be explained. Firstly, though, the general principles with respect to the implementation of the PBC will be outlined and discussed.

3.1 General factors concerning implementation of the problem-based curriculum

It is essential that certain key features of the PBC, namely, the clinical reasoning process, self-directed learning, evaluation procedures and the role of the facilitator be discussed in greater detail, prior to discussing the didactic situation at Unitra. This theoretical background will help place into perspective, the implementation of the novel curriculum at Unitra.

3.1.1 The clinical reasoning process

The notion of a general problem-solving process, often described as the "clinical reasoning process", has been the subject of several investigations. The results of these studies provide evidence of a general mental strategy, a process which has been labelled "the hypothetico-deductive method" (Elstein et al. in, Norman, 1988:280).

The clinician generates several diagnostic hypotheses early in the clinical encounter and proceeds to gather data from history summaries, physical examination and laboratory analyses to support or reject these hypotheses. Thus, the clinical reasoning process represents convergent, vertical or deductive reasoning (Norman, 1980:280).

Barrows & Tamblyn (1980: 19) state that the most important ability the physician needs to have is the clinical reasoning process. This pertains to the cognitive process that is essential for evaluation and management of a patient's medical problem (FIGURE 1).

The above authors chose the term "clinical reasoning" to encompass all the cognitive skills implied in patient evaluation and management. They identified this total process as "problem-solving in medicine". Barrows & Tamblyn in, McQuire (1985:588) state that the process of clinical reasoning can be learned in a conscious, systematic way and that medical schools can facilitate and enhance that learning.

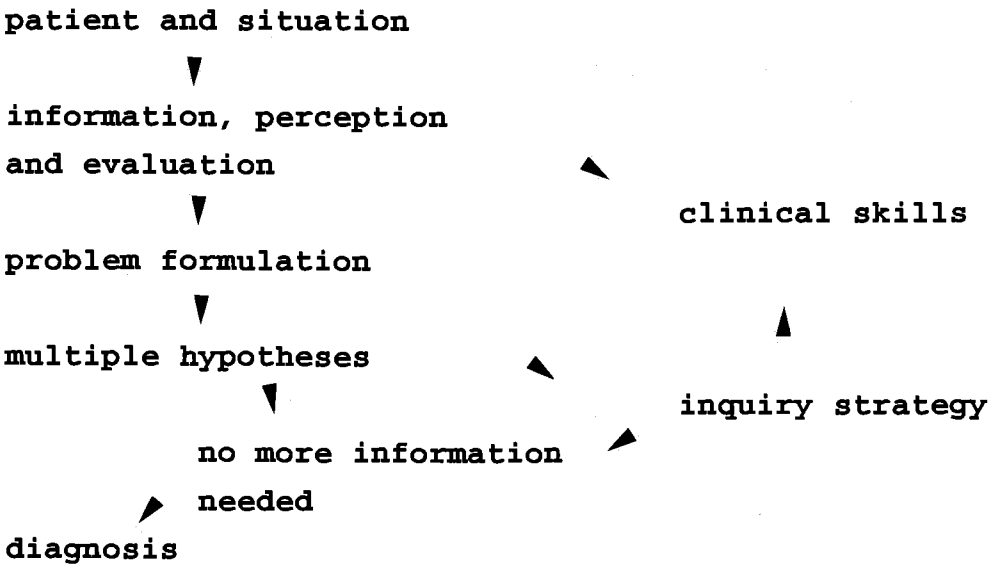

FIGURE 1. STAGES IN THE CLINICAL REASONING PROCESS (BARROWS & TAMBLYN, 1980:40).

Below is a list of the clinical reasoning skills as outlined by Barrows & Tamblyn (1980: 132-133) and Engel et al. (1980:282-283).

1. Data perception and interpretation.

   This refers to the meaning or significance the student attaches to the data and the way he translates it in his work with a problem.

2. Problem formulation

   This pertains to the picture of the problem that develops in the student's mind. The problem formulation continues to grow as more information is obtained during the inquiry process.

3. Hypothesis generation

   It refers to the early generation of hypotheses and the students' ability to rank, modify, eliminate or verify these hypotheses on the basis of the data obtained. According to Elstein et al. (Engel, 1980:282), the range of initial feasible hypotheses generated in the early undergratuate years, should become broader and more sophisticated with more experience of the problems associated with body systems.

4. Inquiry strategy

   This strategy encompasses the type and sequence of actions undertaken by the students to help eliminate, verify or rank

the hypotheses. This may include actions on physical examination, history investigations or treatment. Certain information will tend to support some hypotheses and /or refute others.

5. Diagnostic decisions and patient management.

The making of decisions is an important aspect of the student's skills. It refers to whatever evaluative decisions have been made during the inquiry, on the basis of hypothesis. Engel et al. (1980:283) state that if an item requires knowledge of procedures, or interpretation of results after treatment has begun, then this constitutes patient management. Treatment may involve handling an emergency, then monitoring progress after observation, followed by short- or long- term management.

The implications of the clinical reasoning process is that the student has a good idea of where he is going in the investigation of the patients' problem. Barrows & Tamblyn (1980:34) maintain that there are too many clinicians or students who cannot thoroughly interpret a patient's problem, who miss important findings because they lack good working hypotheses or problem formulations.

3.1.2 Self-directed learning

Ryan (1993:53), asserts that since knowledge often becomes rendunant by the time a student enters professional practice, it is important for educators to ensure that their students are equipped with self-directed learning skills in order to cope with ever increasing knowledge. These skills include the related

cognitive skills of probing, analysing, searching for appropriate information and information sources and synthesis of information in larger concepts (Barrows in, Ryan, 1993:55).

Neufeld & Barrows (1974:1042) continue in the same vein by stating that if clinicians are to be life-long learners and able to keep up with changing concepts and new knowledge, they must develop the requisite skills during their training in medical school. The student is encouraged with appropriate guidance to define his own learning objectives, to select appropriate experiences to achieve these goals and to be responsible for monitoring his own learning progress.

This method of learning is implemented by the students when knowledge is lacking, for example, the knowledge needed to evaluate data against the hypothesis (Barrows & Tamblyn, 1980: 82). The tutor is not supposed to teach and only occasionally acts as a resource person to facilitate student's progress with the problem. As far as possible, the responsibility for learning lies with the student.

Self-directed learning also involves the learning of methods for managing information. For example, basic abilities such as efficient reading and the effective use of filing systems, study notes, medical journals and textbooks and the medical library (Neufeld & Barrows, 1974:1042).

Tough, Knowles and Zimmerman in, Ryan (1993:54), associate self-directed learning with a person's ability to:

* generate learning objectives,
* identify, select and use appropriate learning resources,

* recognise and develop learning patterns and
* evaluate strengths and weaknesses in learning outcomes.

Ryan (1993:54), determined empirically the perceptions of first year students in the Faculty of Health, University of Western Sydney, towards self-directed learning. Students made comments like:

> "One acquires merit and self-esteem when one looks and learns by oneself", and "Feeling responsible and independent at the same time motivated me to increase my knowledge".

They also felt that self-directed learning is a skill that has to be learnt and it takes time and effort to master it.

3.1.3 Ordering of cases and subject content.

> "A case study is a presentation of a real or simulated patient with at least a chief complaint, selected, history and symptoms" (Thomas, 1993: 27).

A complicated case may encompass major complaints accompanied with a history, a medical, social and family history, a complete symptom inventory, laboratory results and treatment of the patient.

The aim of designing cases in this way is to integrate the teaching of basic medical sciences with that of the clinical sciences and thus, to provide a scientific understanding of the disease processes as they affect the various systems of the body. The use of clinical problems emphasises the importance and

relevance of understanding basic science material. The knowledge gained is more easily recalled . At the end of the programme, if the student is faced with a clinical problem, he will have reasonable skills to examine the patient and arrive at a suitable diagnosis far earlier than his counterpart in the traditional programme (Elango et al, 1991:64).

The content to be covered in the PBC is usually divided into "blocks", that is, the "head and neck block", the "thorax block" and the "abdomen block". About five main problems or case studies will be identified in each block and one week allocated to each problem (Elango, 1991:64).

The objectives for each week are given to the students and they will encompass the normal structure and function as well as the altered functions. Each problem is covered by PBL, seminars, lectures, practicals and small group discussions. During the tutorial sessions, the relevant Anatomy, Physiology, Pathology, Microbiology and clinical aspects will be discussed in an integrated way (Elango, 1991:64).

Therefore, the content in a PBC does not follow a textbook sequence. Over time, the student spirals through the same content area several times as he goes through different cases, each time building upon his previous knowledge and applying it at a more sophisticated level (Neufeld & Barrows, 1974:1043).

3.1.4 Evaluation

Reliable and valid assessment techniques that test medical problem-solving abilities is essential to determine what a student knows and what he is likely to do in practice. Thus, the

assessment of the ability to apply medical knowledge in practical situations, leads to evaluation procedures related to performance in practice (De Graaf, 1988:49).

3.1.4.1 The objectively structured clinical examination (OSCE)

The OSCE is a method of assessing a student's clinical competence which is objective rather than subjective and in which the areas being examined are carefully planned by the examiners. During the examinations the student rotates around twenty stations spending about five minutes at each station. At the sound of a bell, the student moves to the next station. A specific component of clinical competence, for example, taking the blood pressure of a patient or interpreting an electrocardiogram (ECG) is tested at each station (Harden & Gleeson, 1979:42).

The above authors claim the the OSCE is more valid than the traditional approach to clinical examinations. The emphasis can depart from testing factual knowledge to testing a repertoir of skills. Moreover, since different stations are used, a larger measure of the student's skills is tested.

The OSPE (objectively structured practical examination) is also used at a medical school in Saudia Arabia (Dissanayake, Ali & Nayar, 1990:300), to test competence in physiological laboratory skills. These authors found a marked improvement in the performance of students taking the OPCE as compared to the old traditional examination. The staff were also better able to evaluate achievements of the objectives of the laboratory classes by using the OSPE.

3.1.4.2 Theoretical examination

The MEQ (modified essay question) was introduced in response to limitations of traditional examination methods as they related to assessing experienced doctors having clinical responsibility in general practice (Hodgkin & Knox in Knox, 1989:51).

The MEQ is produced in the form of a booklet the front page of which consists of a list of instructions. The second page has a brief clinical scenario. At the end of this a series of questions is set out with enough space for the student to write an answer before turning to the next page. Additional information is given which is related to the same scenario. The student may be required to recall factual information or to interpret clinical/laboratory data in the specific situation. Each question is set on a different page and the student is required to move progressively through the scenario as it is developed, without turning back (Knox, 1989:52).

Level 111 questions are usually set. They are questions at the highest cognitive level that can be expected from students (see TABLE 1). Level 11 and occasionally Level 1 questions are set to determine whether students have the ability to recall and understand information. Therefore, Bloom's Taxonomy of cognitive competence (Bloom in, Engel et al., 1980:283), is applied in the setting of the content examination.

LEVEL 1: BASIC RECALL OF INFORMATION AND RECOGNITION OF SIMPLE PATTERNS OF DATA.

LEVEL 11: UNDERSTANDING OF A GENERAL PRINCIPAL OR RELATIONSHIP BETWEEN VARIOUS FACTORS.

LEVEL 111: APPLICATION OF INFORMATION AND/OR UNDERSTANDING OF PRINCIPLES FOR ANALYSIS AND/OR SYNTHESIS IN SOLVING A PROBLEM.

TABLE 1. ABRIDGED AND ADAPTED ANALYSIS OF EXPECTED STUDENT PERFORMANCE IN A MEQ TEST ITEM (ENGEL ET AL., 1980:284).

3.1.4.3 Self- and peer- assessment

Self-directed learning is a process whereby students not only take the initiative in diagnosing their learning needs and goals and implementing appropriate learning strategies, but are also involved in evaluating their performance and getting feedback from other group members about progress (Ryan, 1993:54-56).

During tutorials, the development of the students' self-directed learning skills is actively promoted by the tutors, by helping them reflect on the outcomes of their self-directed learning. Thus, students are regularly encouraged to reflect on their own and their peers' performance. This provides opportunities for discussion about difficulties being faced by students regarding issues such as pressure of work and study methods (Ryan, 1993:62).

Therefore, in PBL, there has been a concern for developing students' ability to access and evaluate their own work in ways

which are applicable to their future profession. According to Bond & Lublin in, Stefani (1994:69),

> "one of the most important processs that can occur in undergratuate education is the growth in students, of their ability to be realistic judges of their own performance and the ability to monitor their own learning".

One of the aims of PBL is to create lifelong learners and self-assessment is an important parameter in this process. Students will be able to evaluate the extent of their progress, in mastering information in later life when formal evaluation is no longer existent. Also, in the workplace one is constantly being assessed by ones peers and this provides a valuable contribution as to how ones abilities are perceived and whether there is room for improvement.

3.1.4.4 Evaluation of the curriculum

An innovative medical course needs to be continually scrutinized in order to improve its standards in medical education. To achieve this, a mechanism must be developed for monitoring and evaluating its medical teaching activities. Two types of information can be gathered-each complementing the other. Qualitative information yields an array of opinions and provides insight into student's experiences of the curriculum. Quantitative information is acquired more systematically and also provides an evaluation of the curriculum (Carr & Rolfe, 1994:12).

3.1.5 The lecturer as facilitator

The andragogical consequence of the PBC is that it requires a redefinition of the role of the lecturer in the learning-teaching relationship. They are not seen as transmitters of knowledge and attitudes, but as facilitators and resource persons in the process of self-directed learning by students (Knowles, 1980: 156).

Most people who are recruited to teach adults have not been taught in this way themselves and this places a heavy burden on the academic staff. Some teachers would prefer to teach as they were taught - in the traditional way. The problem-based curriculum is concerned more with the growth of the individual than the presentation of facts. Tutors must be capable of learning and not just teaching (Knowles, 1980: 17).

The task of the student is not merely to listen, write and memorize but to become involved, think and learn by trial and error. He is expected to learn cognitive reasoning skills and to identify learning issues appropriate to the problem. In this regard, the teacher's role is seen as a guide or facilitator and not as a dispenser of knowledge (Barrows & Tamblyn, 1980: 83).

Therefore, the tutor should take cognisance of the clinical reasoning process and should allow the student to learn by experimentation and inquiry. He should monitor and stimulate the discussions by asking leading questions and raising thought provoking issues. In short, he should help students to help themselves. (Barrows & Tamblyn, 1980: 83).

According to Neufeld & Barrows (1974:1044), the tutor must

understand the general goals and methods of the programme and should be skilled in managing small-group interaction. He should also help the group become gradually more responsible for its own activity. The co-ordination of effective and meaningful evaluation is another task of the tutor. He should himself be a member of the group and be an example of self-directed learning and problem-solving.

Using the facilitating approach, the tutor tries to help the student in his learning progress. This is achieved by encouraging, reinforcing, shaping and hinting (Neufeld & Barrows, 1974:1044). In PBL, the tutor should use the principle of "guided discovery", i.e. allowing the student to learn from his own mistakes but not letting him become totally frustrated by lack of progress.

Postman & Weingartner, in Knowles (1988: 90-92) list the following behaviours observable in tutors using the inquiry (problem-based) method:

(a) The tutor seldom tells students what he thinks they ought to know on the presumption that this would deprive students of the thrill of doing their own finding.
(b) He encourages student-student interaction as opposed to student - teacher interaction. He is interested in students developing their own criteria for judging relevance of ideas.
(c) Tutorials develop from the responses of the students and not from a predetermined "logical" structure. Therefore, he is rarely frustrated by "wrong answers" or irrelevant directions. He is engaged in exploring the way students think and not what they should think. For this reason, he spends more time listening to students rather than talking to them.

In the problem-based curriculum, the lecturer is a facilitator of the learning process. Rogers, in Knowles (1988: 76-77) outlines guidelines for a facilitator of learning.

* The facilitator sets the initial mood or climate of the group.
* He helps to clarify purposes of the individual students in the group and the aims of the group.
* He relies on the motivation of each student to guide them to successful learning.
* He tries to make available a range of sources for learning.
* He regards himself as a flexible resource person.
* He accepts both intellectual content and emotional attitudes.
* The facilitator becomes a participant learner - a member of the group.
* He shares his feelings and thoughts with the group but does not impose them on the students.

Although the role of the tutor needs to defined, it must be remembered that each tutor brings his own individual approach to the tutorial. Neufeld & Barrows (1974:1045) suggests that this individuality must be recognised and used optimally for the benefit of the group.

> "The tutor role definition need not cramp the style of any individual tutor - rather, it should help to clarify relationships within the tutorial group and allow the group to function better" (Neufeld & Barrows, 1974:1045).

3.1.6 Synthesis

In summary of the former part of this chapter, PBL facilitates learning by activating relevant prior knowledge, providing a

learning setting as similar as possible to the setting in which the acquired knowledge is to be used. For this purpose, clinical reasoning skills are inculcated for more effective patient evaluation and management. This is achieved by means of clinical case studies in small group tutorials. The selection and arrangement of content does not follow a textbook pattern but depends on the individual learning needs and goals.

Sound self-directed learning skills will ensure that students become life-long learners, in charge of, and capable of evaluating their own progress in learning. In the PBC, formal evaluation techniques are also implemented to determine whether the aims of the curriculum have been achieved and whether students have grasped the core concepts of the integrated content.

In order to implement the PBC successfully, the role of the lecturer requires redefinition. He becomes a facilitator of self-directed learning and does not merely impart information.

Thus, the first half of this chapter reflects the basic principles of the PBC as they would apply to any educational institution implementing the novel programme. The exact implementation at a particular didactic environment, however, would have to take cognisance of the situation analysis and the needs and aspirations of the target group. It is not surprising that implementation of PBL at one university might look very different to PBL at another university.

Since this study focuses on Unitra students, the implementation of PBL at Unitra receives greater attention in the latter half of this chapter.

3.2 The didactic situation at the University of Transkei

Having discussed the PBC in general, with respect to medical education and at Unitra, the latter part of this chapter focuses on the implementation of the novel curriculum at Unitra, in much greater detail. The way in which the aims and objectives of the curriculum are realised will receive attention as will evaluation strategies and implementation procedures. That is to say, the specifics of what was covered in Chapter 2 (see 2.3), will be discussed in this chapter, as regards the Unitra didactic environment.

3.2.1 Situation analysis

As was outlined in Chapter 2 (see 2.1.3.1), the implementation of a curriculum will be preceded by the results of a situation analysis. It is important, for example, to have an idea of the abilities, interests and aspirations of the very people the curriculum is meant to serve. It is on the basis of the results of the situation analysis that aims and objectives and subsequently content of the curriculum can be drawn up.

For example, at Unitra, the logistic potential for implementation of the novel programme had to be analysed. Also, the calibre of the target group had to be considered as regards their cognitive abilities and previous educational experiences.

The target group would have to be analysed with respect to their intellectual abilities, level of development and needs. In the following subsections, the characteristics of the second year medical students is discussed to give the reader an idea of the type of students who are involved in this study.

3.2.1.1 Cognitive abilities of the target group

Most students have been accustomed to rote memorization of material for reproduction in the examinations. They have been exposed to an inferior education system which encouraged rote learning and some lack the skills for critical, independent thinking. Some students, however, excell at their work, obtaining between 70%-80% in tests and examinations. Few students obtain distinctions with the majority scoring between 50-60 %.

3.2.1.2 Level of development of the target group

Most students have only completed matric and first year MBChB. Few have obtained BSc. degrees with some holding qualifications in other fields, for example, nursing and teaching.

This writer agrees with Neufeld & Barrows (1974:1043) who states that students bring a wide variety of expertise to the program based on many years of problem-solving experiences in their personal lives and in education. Some second year medical students at Unitra are already in possession of university degrees and may have spent several years in the labour market. These students contribute significantly to discussions by sharing their previous experiences with members in the group.

3.2.1.3 Learning needs, preferences and styles of the target group

From personal interviews with students, it is evident that the majority find it less frustrating and more convenient to simply

get lecture notes from the lecturer and to master the information given. An observation made by faculty is that few students take the initiative to do extra reading on their own and to be critical of what they hear/read. The PBL system, however, encourages students to be independent learners and this demands a great deal of determination and responsibility. This sometimes creates insecurity resulting in the preference by some students to simply receive lecture notes and to obviate the need for self-study.

It was also noticed by this writer that some students prefer to study material by themselves although it takes longer and is more difficult. Even if lectures are given these students come prepared and engage actively in discussions. There have been occasions when students have contacted other institutions, hospitals and laboratories to gather information to solve a problem.

Each student has his own method and style of studying. Indeed, when a method of learning is suggested to them, they politely remind faculty that they are more comfortable with their own method. Group study has become very popular since the inception of the PBC, as students feel they can thrash out difficult concepts and help each other. The brighter students benefit because in the process of teaching the weaker ones, they are reinforcing their understanding of the material.

3.2.1.4 Psycho-social situation of the target group

There are 37 students that comprise the second year MBChB class. The majority of students are black and come from a predominantly rural community. These students have been subjected to an

inferior education system and can therefore be considered to be educationally disadvantaged. Some students are Indian with a middle-class background but their primary and secondary education can also be considered to be inferior.

Nevertheless, most students are well motivated and work hard to achieve good results in the examinations. These students will often consult with lecturers after a tutorial or lecture to discuss issues of contention. Some students, however, are less motivated and this is reflected in their examination results.

The majority of students are young, in the age group 18-20 years while some mature students (30-40 years) are also present. Generally, the mature students have already trained and worked in some other or related field before switching to medicine. These students bring to the learning situation a great deal of prior knowledge and experience.

3.2.2 Typical course layout.

The programme of study for the PBC is:

* problem-based
* student centred
* integrated
* community orientated.

The course is divided into the basic sciences (integrated with the clinical components) and community-based experience and services (COBES). The latter entails students working in the peripheral hospitals for about four weeks.

3.2.2.1 Community-based experience and services

The main thrust of community-based education is to involve the community throughout the entire educational experience since the community is an important environment in which learning takes place (Refaat, Nooman & Richards, 1989:8-9). The aim of a community-based curriculum is to provide students with an opportunity to relate theory being learnt at university, to the real life experiences in the community. For example, the students at Unitra have been involved in determining the nutritional status of children in Transkei for implemention of a feeding scheme through the government's reconstructon and development programme (RDP).

The emphasis in this study, however, is on the basic science / clinical component.

3.2.2.2 The basic sciences

At second year level, the basic subjects studied are Biochemistry, Physiology and Anatomy. The aim of Biochemistry is to enable students to understand the normal functioning of the human body at the molecular and cellular level. Students cover specific areas such as:

* structure, function and metabolism of proteins, lipids, carbohydrates and nucleic acids,
* intermediary metabolism,
* enzymology,
* acid-base regulation,
* blood composition and function,
* biosynthesis of macromolecular precursors viz. membrane lipids, steroid hormones, heme and nucleotides.
* excitable tissue.

Since the curriculum is integrated and there is so much overlap between Physiology and Biochemistry, aspects covered in Biochemistry are also covered in Physiology. The aim of Physiology is also to instill a knowledge of the functioning of the body at the organ level. For example, renal physiology , cardiology and respiration, amongst other things, will be studied.

The aim of teaching Anatomy is for students to appreciate the gross and microscopic structure (Histology) of the different organs and systems of the body. Blood supply and innervation to the organs (for example, the heart and lungs) as well as embryological development also constitutes important aims of the course.

3.2.2.3 Syllabus

The syllabus includes the integrated syllabi of the traditional curriculum with respect to Biochemistry, Anatomy, Physiology and Community Medicine.

These subjects are integrated in a manner which will enable the student to understand the various organ systems - their structure and cellular functioning, of the whole patient. The patient is also put into context with respect to his environment and community that is he is seen as a person and not a cluster of organs which nature has ingeniously put together.

3.2.2.4 Process

Students are divided into groups of six students with two tutors (a basic scientist and a clinician) in each group. Tutors and

students change groups every term. Students approach a clinical problem "cold" in tutorials, that is, without preparation. They then discuss the clinical case following the clinical reasoning process (see 3.4.1.1) and also generate relevant learning issues in a self-directed manner, under the guidance of tutors. Students will then look up information from resources such as: textbooks, journals, computers, faculty staff, audio-visual material or pathology laboratories.

They will return for the second session of the tutorial having acquired this new information and knowledge. This information is presented to the group and by the process of discussions and sharing of knowledge, the group will grasp the basic concepts pertinent to the relevant subjects. Thus, the process is student-centred.

Students are presented with a clinical case in the form of paper patients. The task of the student is to grapple with the problem from the point of view of basic mechanisms to gain insight into the biological and behavioural aspects of the patient's disease. Management of the patient's problem is discussed when appropriate.

Concepts which students find difficult to grasp on their own, are discussed in a "lecture" to facilitate understanding. These "lectures" are only given after the student has attempted to study the material on his own in a self-directed manner. Mitchell (1988:64), describes lecture series which are held in parallel with the problem-solving process. This defeats the purpose of self-directed learning because the lecturer gives information which he considers to be important, neglecting the learning objectives the student has set for himself.

3.2.3 Lecturer's perspectives

The successful adoption of a PBC depends largely on the acceptance of the programme by those who teach it (Wilkerson & Maxwell, in Elango, 1991: 66). From personal discussions with the majority of lecturers at Unitra, and feedback obtained during curriculum meetings, it would appear that these lecturers have welcomed the introduction of the PBC and have expressed enthusiasm in the implementation of the programme.

Initially, there were some reservations and doubts as to whether students would be in a position to engage in self-directed learning and then perform adequately in an examination. This feeling was enhanced when it became evident that students were having problems in looking up and trying to understand information by themselves. Biochemistry, especially, was a difficult subject for the students to learn on their own. This problem was probably compounded by the fact that the majority of students had been accustomed to rote memorization of facts in their secondary education and were now expected to be self-directed learners. One way of addressing this problem was to offer more help, namely, by giving lectures.

Lecturers also felt that they had been thrown into a new didactic situation and were now tutors or facilitators of the clinical reasoning process in group discussions. This was entirely different to the traditional curriculum that involved lecturing only. To add to this, each lecturer had to be able to tutor the subject of which he is a specialist (for example, Biochemistry) as well as two other subjects (for example, Anatomy and Physiology). The change of the PBC was, therefore, seen to be rather stressful.

Furthermore, there are two tutors in a group which meant that each basic scientist has to tutor with a clinician. From this writer's experience, this sometimes causes problems as one tutor would want to dominate the discussions and would promote what he wants the students to know. Some tutors tended to interact inappropriately with colleagues in front of students, simply because they had never been in this type of didactic situation before. Students would sense this rift between tutors and would become uncomfortable.

3.2.4 Logistical potential of faculty / university.

Another parameter which forms part of the situation analysis is logistics. In this subsection, the logistics of the Unitra environment is discussed, namely, staff, time, resource centre and tutorial rooms.

3.2.4.1 Staff

In any curriculum development project, the most important logistic factor is availability of staff, since they will make implementation of the curriculum a practical possibility.
Members of the academic staff who are involved in the implementation of the PBC at Unitra, comprise:

* Biochemistry: 2
* Physiology : 2
* Anatomy : 3

Clinicians who are employed jointly by the Umtata General Hospital and the University of Transkei, are recruited as tutors to facilitate the clinical reasoning process during tutorials.

The faculty administrator handles the administrative functions of the programme under the supervision of the Director of Medical Education at Unitra.

3.2.4.2 Tutorial rooms

At the outset, there was a problem in obtaining a suitable venue for the tutorials, and seminar rooms were used. This problem has been rectified and a section of the library has been renovated and tutorial rooms built. Chalkboards have been installed, lighting fitted and furniture put in to make the environment more conducive to learning. The tutorial rooms are large enough to accommodate the eight members of the group.

3.2.4.3 Resource centre

Relevant library books have been purchased by the university for use by students. Each tutorial group has a set of these books, which helps them in the self-directed learning process. Despite this, there is still a shortage of certain textbooks in the main library. Also, tutors do not have a library of books for their personal use, and this problem needs to be sorted out soon.
A media or resource centre for proper implementation of the programme has been set up. This centre houses video machines and tapes, books, slide projectors and computers.

3.2.4.4 Time

A time-table is inserted as FIGURE 2, to give an idea of what the programme entails for the students, on a weekly basis. Those regions of the time-table which are blank are "free" periods for the student when they are supposed to be engaging in independent, self-directed study.

	Monday	Tuesday	Wednesday	Thursday	Friday
8.00-9.00		Biochem-istry	Physio-logy	Biochem-istry	
9.00-10.00	tutorial	Biochem-istry	Physio-logy	Biochem-istry	tutorial
10.00-11.00	tutorial		Physio-logy	Anatomy practical	tutorial
11.00-12.00	tutorial		Anatomy practical	Anatomy practical	tutorial
12.00-13.00			Anatomy practical	Anatomy practical	meeting
13.00-14.00	*********	L U N C H	*********	*********	******
14.00-16.30	Histology & Dissec-tion	Histology /Physio-logy practical	Histology / Physio-logy practical	Biochem-istry practical	Clinical skills

FIGURE 2. TIME-TABLE FOR MBCHB 11, FACULTY OF MEDICINE, UNIVERSITY OF TRANSKEI

3.3 Aims and objectives of the problem-based curriculum.

The aim of the integrated, PBC is to integrate the teaching of basic medical sciences with that of the clinical sciences to provide a scientific understanding of the disease processes as they affect the various systems of the body.

The most important objectives of PBL are:

(a) Structuring of knowledge for use in clinical context. Learning should occur in a clinical setting to facilitate retention, recall and application of basic science information in clinical work (Schmidt in Barrows, 1986:481).

(b) The developing of an effective clinical reasoning process. The problem solving skills involved in the clinical reasoning process include hypothesis generation, inquiry, data analysis, problem synthesis and decision-making. These must be developed together with the acquisition of basic science information to ensure that problem-solving and knowledge will work together in a clinical set-up (Simon in Barrows, 1986: 482).

(c) The development of effective self-directed learning skills. These skills enable the student to search for and learn the appropriate knowledge by themselves, for the solving of clinical problems (Barrows, 1986: 482). Self-directed learning skills also involve recognizing personal educational needs, selecting appropriate learning resources and evaluating progress (Neufeld & Barrows, 1974:1041).

(d) Encouragement of independent, critical thinking.

(e) Inculcating sensitivity to the medical and psychosocial needs of the patient.

(f) Enhancement of integration of information.

(g) Encouraging of group interaction and co-operative learning.

(h) Increased motivation. This increases an internal drive for learning and facilitating extraction and understanding of information from learning resources (Berner in Barrows, 1986: 482).

(i) To recognise, maintain and develop personal characteristics and attitudes required for professional life (Neufeld & Barrows, 1974:1041).

(j) To identify and define health problems and to search for information in order to resolve or manage these problems (Neufeld & Barrows, 1974:1040).

(k) Given a health problem, to examine the underlying physical or behavioural mechanisms. A spectrum of phenomena might be included, from molecular events to those involving the patient's family and community (Neufeld & Barrows, 1974:1041).

(l) To be aware and to be able to work in a variety of health care settings (Neufeld & Barrows, 1974:1041).

3.4 Methods

Once the aims and objectives have been set and the content decided upon, appropriate methods will have to be chosen to achieve these

objectives and to put the content across to the learners. In PBL, the main method of instruction is through small group tutorials.

3.4.1 Tutorial groups in PBL.

Nearly all medical schools implementing PBL are using small group tutoring as a means to achieve their aims (Kaufman, 1985: 47). The University of Transkei is no exception. Tutorial groups consist of six to eight students with two members of faculty as group facilitators. Two hour tutorial sessions are held three times a week. A new case study is conducted weekly.

The benefits of introducing small group tutorials at Unitra were tantamount to those described in the literature, namely that they represent a laboratory of learning about human interaction where a student can inculcate interpersonal skills and become attentive to his own emotional reactions. It is an opportunity to learn how to listen and speak as well as to receive criticism and in turn to offer constructive criticism. Tutorials also provide a forum for problem-solving where the combined resources of group members is greater than the sum of individual abilities. Furthermore, the tutorial setting facilitates the process of self-, peer- and tutor-evaluation (Neufeld & Barrows, 1974:1044).

The tutorial group is to provide an environment for the accomplishment of the following objectives:-

(1) clinical reasoning and problem-solving.
(2) self-directed learning
(3) communication skills
(4) self and peer evaluation and
(5) support (Kaufman, 1985: 46).

3.4.1.1 The clinical reasoning process

During tutorial sessions, the students at Unitra go through a sequence of procedures which constitutes the clinical reasoning process, in order to solve a clinical problem. This pattern of events is similar to those depicted in FIGURE 1, illustrated at the beginning of the chapter (see 3.1.1). It starts with the students encountering a patient problem, generating hypotheses, acquiring relevant data and then formulating the diagnosis. In the process, they develop relevant inquiry strategies and clinical skills.

At the start of a clinical case, students would read the scenario outlined, extract important information and relay it to the team member who stands at the chalkboard writing down this data. From this information, various hypotheses are generated. Students would ask for relevant laboratory and physical examination summaries to test their hypotheses. During this process, they will identify limitations in knowledge and generate learning issues.

They will then read up these learning issues in Biochemistry, Physiology and Anatomy and meet for the next session when this knowledge can be applied to the patient's problem. Hypotheses will be reranked, re-generated and/or eliminated until a feasible solution can be found. It is then that a diagnosis is made.

3.4.1.2 Self-directed learning at the University of Transkei

While going through a clinical case, students would identify limitations in their knowledge and generate relevent learning issues. Before the start of the next tutorial session, they would look up information on these learning issues using textbooks, videos and slides in the resource centre. Faculty members would also be consulted if students struggled to understand certain concepts.

Armed with this information, they would go back to the case study to test their hypotheses and come up with a diagnosis. During this process, the Biochemical, Physiological and Anatomical aspects of the patient's illness would have been understood. Therefore, the onus for learning is on the student. He decides what he is going to learn and how he will go about doing this. The tutor's input is minimal except when he guides the student in the understanding of difficult concepts.

3.4.2 Ordering of cases and subject content

The clinical cases are based on real patients to inculcate in students an understanding of the patient's psychosocial environment. The arrangement of subject content and the clinical cases, in the Medical Faculty at Unitra, follow an Anatomical ordering.

At other universities, for example, McMaster University, the spiral approach is used, whereby the student spirals through the same content several times in the programme, each at a more in-depth or broadly applied level (Neufeld & Barrows, 1974:1043).

On a visit to the University of Newcastle in Australia, this writer spoke to the Head of the Biochemistry Department, Professor P. Dunkley, about the teaching of Biochemistry through the PBC. It is evident that they also use the spiral approach since students are required to digest sections of information which are expanded on in subsequent years. Biochemistry is learnt/taught over a period of six years.

At present, Biochemistry, as well as Physiology and Anatomy, is covered in one year at Unitra. If "phasing" is to be introduced next year, the second and third year subjects will be integrated and taught over a two year period. This is referred to as vertical integration.

At this stage in the implementation of the novel programme at Unitra, the integration of subjects is horizontal, that is, only subjects studied in a particular year are integrated. The ordering of case studies is structured according to the teaching of Anatomy. Hence the terms "thorax block", "abdomen block" and "head and neck block" are used. Each block is covered over a period of about seven weeks. The clinical cases that have been covered, include:

(1) Thorax block:
* asthma,
* gun shot wound.
* breast cancer,
* malnutrition,
* mitral valve disease,
* congenital heart disease.

(2) Abdomen block:
* ambiguous genitalia,
* diarrhea,
* pancreatitis
* oedema and ascites,
* dyspepsia,
* anuria, haematuria and protenuria,
* amenorrhea, low abdominal pain.

(3) Head, neck and limbs blocks:
* diabetes newropathy,
* subclavian vein thrombosis,
* upper and lower limbs,
* hyperthyroidism,
* paratoid tumour,
* pituitary and hypothalamus,
* central nervous system lesion hunt.

Main clinical problems are identified in each block and one week allocated to each problem or clinical case. There are two tutorial

sessions of three hours each, during which time each problem is covered by PBL. Lectures, dissections (Anatomy), practicals and clinical demonstrations are also held to coincide with each case study.

A typical problem from the abdomen block is presented below.

SCENARIO:
For three days, Billy Mbekeni, a 42-year old school teacher, has suffered from epigastric pain. You're working in casualty. He comes to you for help.

TASKS:
What are your initial thoughts regarding the cause of this patient's problem? Explain your reasoning.
What further information would you like to have? Explain your reasoning.

HISTORY SUMMARY:

Questioning reveals that the epigastric pain is sharp, constant and radiating through to Mr. Mbekeni's back. It is aggravated by food. There have been two similar episodes of pain within the past year.

PHYSICAL EXAMINATION SUMMARY:
Physical examination reveals abdominal distention, epigastric tenderness, fever and absent bowel sounds.

TASKS: Does the new information make you want to change your list of hypotheses? Do you want to eliminate, re-rank, or add any possibilities? Explain your reasoning. What laboratory tests will you request to further define and test your hypotheses?

LABORATORY RESULTS SUMMARY:

Complete blood count (CBC)

WBC:	12,500/mm
RBC:	3,900,000/mm
Hgb:	11,8 g/dl
Hct:	34%

Total bilirubin:	8umol/l
AST:	230 units/l
Alkaline phosphatase:	185: units/l
amylase (serum):	545 IU/l
amylase (urine):	480 IU/l/h
creatinine (serun):	1.5 mg/dl
creatinine (urine):	22 mg/dl/24h

TASKS: Refer to the laboratory results summary. What do the laboratory values indicate?

SCENARIO CONTINUED:

On questioning, Mr. Mbekeni admits to drinking a bit too much. He is vague as to exactly how much. You decide to perform an abdominal ultrasound scan to explore any of the following:

calcification of the pancreas

biliary stones

free air under the diaphragm

renal stones

ileus "sentinal loops"

Imaging results summary:

The patients abdominal ultrasound shows no pancreatic calcification of ileus. No biliary stones are evident.

TASKS:
How would these ultrasound findings help you modify your hypotheses?

SCENARIO CONTINUED:

You diagnose acute pancreatitis and treat the patient with:
hospitalization
intravenous fluids
narcotic pain medication, and
nosogastric intubation with continuous suction.

TASKS:
Explain the rationale for the treatment. Why were no antibiotics used?

As each case study is handled, learning issues in the three basic science subjects are generated. TABLE 2 gives a concise example of specific learning issues that are generated for the above clinical problem.

ANATOMY	BIOCHEMISTRY	PHYSIOLOGY
- gross anatomy of pancreas - histology of pancreas - anatomy of biliary tree, pancreas, duodenum. - general arrangement of blood supply to gastro-intestinal tract. embryology of pancreas, biliary system and liver	- pancreatic secretions and their biochemical functions	- pancreatic cell types and their functions. - control of pancreatic secretion: cephalic, - and intestinal phases

TABLE 2. ABDOMEN BLOCK: PROBLEM: PANCREATITIS AND THE RELEVANT LEARNING ISSUES.

Students would read up these learning issues (TABLE 2) and present their findings or knowledge acquired at the tutorial. The tutors do not divulge information freely but merely guide the students or clarify difficult concepts. Thus, it is essential for the tutor to be thoroughly familiar with all the learning issues in each subject.

3.4.3 Evaluation

Evaluation is a shared responsibility between students, peers and lecturers and feedback to learners is emphasised. Evaluation occurs at different levels: self-assessment, tutorial -based peer and tutor

evaluation, individualized process assessment (IPA), objectively structured clinical examination (OSCE) and the theoretical content examination.

3.4.3.1 Individualized process examination

In the first step of the IPA, the student is presented with a paper patient and his clinical reasoning process as well as his ability to generate relevant learning issues, is assessed. The second step is a type of modified oral examination where students are assessed on their ability to independently search for and synthesise basic information pertinent to the paper case.

3.4.3.2 Objectively structured clinical examinaton

At Unitra the OSCE as well as an OSPE (objectively structured practical examination) are used in the assessment of students. The OSPE is very similar to the OSCE except that in the former, questions are also set on the Biochemistry, Physiology and Anatomy practicals that the students have done. For example, at a particular station, students may be required to identify a section of the kidney at the macro and micro level and then discuss the physiological functions of the kidney.

3.4.3.3 The theoretical examination (summative assessment)

The theoretical paper in Biochemistry, Physiology and Anatomy at Unitra consist mainly of a type of modified essay questions (MEQ). The "MEQ" differs from that described at the beginning of this chapter (see 3.1.4.2), in the sense that the whole clinical scenario is given all at once and students are then required to answer questions based on that scenario (see below).

A specific example of a "MEQ" (in a Biochemistry test) is given below:

Question 1.
A motor car accident occurred in Umtata and a 40 year old lady was injured in the accident. She was rushed to hospital, bleeding profusely. While attending to the patient, the following data was collected:
Blood pressure: 100/70
temperature: 36°C
pulse: 110/min
respiration: 25/min

Her skin was cool, pale and moist. The blood gas analysis showed the following data:
pH: 7.2
pCO_2 :38 mmHg
HCO_3 : 19 mmol/l
Answer the following questions:

(a) What type of acid-base imbalance is expressed by the above results? How do cells derive metabolic energy for survival during such a state?

(b) What will be the consequences of the above processes if not treated immediately?

(c) Will the oxygen carrying capacity of haemoglobin be affected by the above process? Explain your answer using the oxygen saturation curve.

3.4.3.4 Self- and peer-assessment

In a self-evaluation exercise, the student makes value judgements about his own performance and also that of his peers. Students are

required to fill in assessment forms wherein they rate their own strengths and weaknesses. A similar form is filled in for each of their peers in the tutorial group, at the end of every block.

3.4.3.5 Tutor assessment

Each student in the group is evaluated by the tutors. They are assessed with respect to their clinical reasoning skills, knowledge acquisition, interpersonal skills and self-directed learning abilities. A percentage is given and taken as the overall score.

3.4.3.6 Total assessment

At the end of each term, oral and written data of each student's performance is collected and a mark is given.

Most universities implementing the PBC arrive at a decision of sarisfactory or unsatisfactory accomplishment regarding students' performance. A similar approach was not feasible at Unitra since administration demanded that a mark be given for each student. Also, students felt uneasy and wanted to know what mark they received. Furthermore, students sometimes transfer to other medical schools adopting the traditional curriculum,midway through their training and satisfactory or unsatisfactory would not suffice at those institutions.

3.4.4 Evaluation of the curriculum

In this study, a qualitative investigation is undertaken to evaluate the curriculum, by determining the perceptions of Unitra medical students towards the new programme.

Professor G. Camp from Bowman Gray School of Medicine, USA, visited Unitra in April 1994 as an external evaluator. She spent three weeks interacting with staff and students and assessing the implemention of the curriculum. Her report is discussed at length in Chapter 6 (see 6.10.2) of this study.

3.5 The lecturer as facilitator.

Most of the staff at Unitra were unfamiliar with PBL or what the facilitator's role entailed. Therefore, lecturers were the recipients of a crash familiarization course. This took the form of a week long workshop aimed at familiarizing academic staff with the techniques of PBL. Ongoing workshops are also held annually.

3.6 Reactions to the change in curriculum

3.6.1 Lecturers

Maxwell & Wilkerson (1990:513) cite that the success of a curricular innovation will depend on the acceptance by the faculty who use it. Research has shown that innovations often fail because of resistance from those required to implement them. Thus, if PBL is to become widespread in medical education, it would have to be accepted by all- whether they are enthusiastic converts, or hostile, indifferent and skeptical to the philosophy of the new curriculum.

According to Mennin & Kaufman (1989: 10), faculty staff who were used to controlling the curriculum experienced fear that they had lost control when the problem-based curriculum was implemented. Previously, they had determined what, when, where, how much and in what format students were to be taught. They perceived this challenge as a threat to their status.

A similar sentiment tended to prevail at the Medical Faculty at Unitra when the new curriculum was initially implemented. Some members of staff felt very disorientated because the new curriculum did not follow a textbook fashion of instruction. There was the criticism that staff chosen to supervise the students were not necessarily experts in all the subjects they were tutoring. For example, Biochemists were tutoring students in Anatomy and Physiology.

Initially, a major problem for tutors in this writer's didactic environment was that they had the dilemma of being quiet as students struggled with a problem until it was resolved and hopefully a higher level of understanding was attained. Some tutors had difficulty in restraining themselves from teaching as they felt it would be easier to simply give the students the information than to see them grapple with concepts.

A problem cited by Walton & Matthews (1989: 542) is that teachers who are initially involved in PBL do not know the basic concepts or the underlying principles of PBL. A similar constraint was experienced at Unitra.

Problem-based education was alien to the majority of Unitra faculty staff and everyone had to learn by trial and error. This sometimes frustrated the students who, themselves were grappling with the new situation.

It is interesting that Wolff (1979:396) writes that, even medical teachers who were interested in PBL were daunted by the complexities and obstacles and were unable to introduce it in their own teaching. Indeed, even the staff at Unitra felt daunted at times but were determined to succeed.

The lecturing staff were aware of their limitations and continued to work hard to overcome this. Their dedication was evident when they were prepared to sacrifice public holidays in order to adhere to the tutorial schedule.

This writer is certain that the staff at Unitra share the perceptions and sentiments of the tutors at McMaster University who found that, by functioning as non-expert tutors, they could update their knowledge in a particular area while working with students. In this way, they could maintain an appropriate perspective on problems in the health field and on new knowledge which is available. They could also share the excitement of exploring and discovering new ideas (Neufeld & Barrows, 1974:1045).

Additionally, staff reactions at Unitra can be compared to reactions at the University of the West Indies where the spectrum of staff perceptions ranged from cynicism, reluctance and reserve to enthusiasm and determination to effect change (Pinto Perreira et al., 1993:353).

Additionally, PBL makes extra demands on student and teacher time. This has proven to be a major problem at Unitra especially in the initial stages. Students, in particular, find this to be more stressful. They also have to shoulder a greater responsibility for their own learning and have to work harder.

3.6.2 Students

This writer found that at first, there was a general feeling of insecurity and aimlessness amongst the students at Unitra, mainly because they were so accustomed to the traditional curriculum that problem-based education was considered to be a major change in their

lives. They found it difficult to subscribe to the fact that there was no set syllabus for the different subjects they were studying. The learning issues in the basic sciences which were generated at tutorials followed an anatomical ordering and were based on the cases being studied.

Another observation made by this writer was that students who were introverts found PBL very stressful since they were forced to talk, interact and participate during tutorials. The extrovert, motivated students, however, could show off their knowledge. Also, weak students were forced to work consistently or be embarrassed - peer pressure ensured that everyone did their work.

The reactions of Unitra students to the induction of PBL are no different from the students at the University of the West Indies who complained that :

* they did not know the depth of information required,
* too much work had to be covered in too little time, and
* there were too many learning objectives (Pinto Pereira et al., 1993:358).

At a workshop held by Unitra at a Transkei wildcoast resort, a representative of the MBChB 11 class of 1994 presented a talk on the class perceptions of the problem-based curriculum. It was evident that they considered the problem-based curriculum to be essential in promoting interpersonal skills and exposing them to the disadvantaged communities.

A major grievance is that of lack of time to tackle this strenous curriculum. There are a lot of learning issues to cover and there is no time to understand all the material. They requested that they be guided by the tutors as to which learning issues are the most

relevant. At the end of each case, there should be a lecture/discussion to ascertain the level of students' understanding of the subject matter.

Another complaint was that some tutors teach while others facilitate. Tutors came under fire for promoting their subject specialities and students accused some tutors for being "interrogators". Students ought to have a say in who tutors them.

There was dissatisfaction that one weekend was inadequate preparation time for the examinations. The marks given to students in the IPA fluctuated considerably, for example, some students were given 40% and others, 75%. Students felt that this type of assessment was very subjective. In any event, competition between students should be eliminated by not giving marks and another system should be considered.

Another sentiment expressed was that the second semester in first year be used as a bridging gap for second year, that is, PBL should be introduced in first year.

In the estimation of the author of this dissertation,

> "students also found it a difficult challenge when they had to be more autonomous and depend less on the lecturers. Students often request for lectures to be given in areas of difficulty, to which faculty staff at Unitra readily oblige. This is an indication that they are not totally self-reliant yet as far as independent study is concerned".

The answers given in the questionnaire will give a better insight into students' reactions to PBL (see 5.6 and 5.7).

3.7 Synthesis and conclusion

Therefore, the programme at Unitra is problem-based, student-centred, integrated and community-orientated. Students engage in self-directed learning and are not dependent on the lecturer for knowledge. The main method of instruction is the small group tutorial where discussions and the exchange of ideas and knowledge occur.

Students approach a clinical problem "cold" in tutorial sessions and as they go through the clinical scenarios, learning issues and hypotheses are generated. The relevant learning issues are studied and applied to the problem. Hypotheses are reranked, eliminated or added and the case scrutinized further until a diagnosis is made. The task of the tutor is to facilitate this learning process rather than to lecture.

The evaluation of student performance gives an idea as to whether the aims and objectives of the curriculum had been achieved and whether the content had been understood by the students. Thus, evaluation procedures which tests to what extent students had achieved clinical reasoning skills, self-directed learning skills and the other aims of the curriculum, had to be developed. The OSCE/OSPE, IPA, content examination as well as self-, peer- and tutor-assessment, are the methods used for evaluation of student performance.

For the majority of acadamic staff at Unitra, this was a novel way of teaching and learning; the new curriculum presented many challenges. Training programmes were held at the start of the new programme to orientate faculty towards implementation of the curriculum. Most members of staff were enthusiastic and dedicated while a few had some reservations about the novel programme.

Although most students come from disadvantaged communities and were exposed to a system of education that encouraged rote memorization of information, they have given faculty the impression that they were able to adapt to the new system of teaching and learning , with ease. Nevertheless, the opinions, feelings and attitudes of the students with respect to the novel curriculum, will be determined empirically in this study.

Thus, Chapter 3 would have put the implementation of the innovative curriculum into perspective. The reader will know who is involved, what are the aims and objectives of the curriculum, how it is implemented and how evaluation methods are effected.

The following chapter deals with a general description of the adult learner and adult learning as well as student attitudes as a variable in adult teaching and learning. The affective domain of the didactic situation, namely, feelings, emotions and attitudes are an integral component of any curriculum. Also, since this study is concerned with the perceptions of students, it is important to know what effect this has on motivation and hence on the didactic situation.

CHAPTER 4

STUDENT ATTITUDES AS A VARIABLE IN ADULT TEACHING AND LEARNING

The previous chapter focused on the didactic situation at Unitra wherein the precise implementation of the PBC was described. Chapter 3 emphasised the cognitive aspect of this study. This chapter describes the affective domain of teaching and learning, that is the feelings, attitudes and perceptions of students in a didactic environment. Before that is done, a description is given of the adult learner and adult learning in order to put into perspective the affective aspect of the rest of the chapter.

4.1 The adult learner and adult learning

The Andragogical model for adult learning (Knowles, 1990:57-61) is explained below. This model describes the adult learner and learning in terms of "the need to know", "the learner's self-concept", "the role of the learner's experience", "readiness to learn" and "orientation to learning".

4.1.2 The Andragogical model

Andragogy refers to the science that deals with the accompaniment or education of one adult by another (Oberholzer et al,1989:6). The Andragogical model is based on the following assumptions about the adult learner:

(a) The need to know. Prior to learning something, adults need to first know why they are learning it. Once adults start to learn something on their own, they will energetically probe into the benefits they will gain from learning it (Tough, in Knowles, 1990:57). The Humanistic Psychologists would equate this drive to learn something, to instrinsic learning or motivation which involves learning to be human. This involves the acquisition and learning of life skills and does not depend on what the teacher wants for his students but what the students want for themselves (Curzon, 1990:98).

(b) The learner's self-concept. Once adults have arrived at a self-concept of being responsible for their own decisions, they have already developed a psychological need to be seen as self-directing. They would avoid situations which is in conflict with this need, for example, if they are treated as children or if others are too imposing and authoritarian (Knowles, 1990:58). According to Rogers, in Curzon (1990:102), the learning process will be enhanced if the learning environment provides personal security and does not pose a threat to the self.

(c) The role of the learner's experience. Adults, by virtue of having lived longer, have accumulated more experience than they had as youths. A group of adults will be different in terms of background, learning styles, motivations, needs and goals. Indeed, the richest resources for learning are to be found in the adults themselves (Knowles, 1990:59). Curzon (1990:228), states that the experience of the older student will enable him to make more accurate decisions and

under stressful conditions at that. On a more negative note, with the accumulation of experience, comes the tendency for adults to close their minds to new ideas, new perceptions and creative ways of thinking (Knowles, 1990:59).

(d) Readiness to learn. Adults become ready to learn those things they need to know in order to be able to cope with real life situations. This "readiness to learn" is usually influenced by development tasks associated with moving from one developmental stage to another. Thus, the timing of learning experiences should coincide with the developmental task (Knowles, 1990:60).

(e) Orientation to learning. Adults are motivated to learn something if they consider it to be helpful in performing tasks pertaining to their life situations. They will acquire new knowledge , skills, attitudes and values most effectively when placed in the context of application to real life-situations (Knowles, 1990:61). Also, adults' orientation to learning is life-centred, therefore, the appropriate units for organizing adult learning are life situations, not subjects (Lindeman in Knowles, 1990:31). People who are learning-orientated seek knowledge for its own sake. They have usually been engaged in learning for a long time and have been avid readers since childhood (Knowles, 1990:47).

4.2. Feelings of adults

It is a common misconception that, while the child is a "bundle of emotions", the adult lacks feelings. In fact, the opposite is true.

The adult has fewer but more emotional associations with factual material than do children (Kidd, 1973: 95).

Adults may carry the burden of failure or unpleasantness associated with learning during childhood. If the adult has negative feelings about schooling or if learning is associated with past failures, he will try to protect his "self" from threat by avoiding any new learning experiences (Kidd, 1973: 96). Adults may also have reservations about change. Change implies disturbance and a human being is prepared only to tolerate disturbance under some conditions and not others. People generally don't like to change but everyone has to at some time or the other (Kidd, 1973: 97). In the light of this dissertation, the change from the traditional curriculum to PBL may have caused dissonance or uneasiness in some students.

Furthermore, studies and observations have reported that older people are rigid and inflexible in their ways. When planning a programme or curriculum with older people in mind, this factor cannot be neglected (Kidd, 1973: 99).

Many studies have shown the relationship between anxiety and impaired learning. If a student is constantly criticised and belittled, he is less likely to develop a love for learning. He may learn to defend and protect himself and would avoid similar experiences until he is able to escape. By helping the adult student to relax and reduce tension, one would be helping him improve his study skills (Kidd, 1973: 100).

This study is concerned with the feelings and attitudes of students towards the newly implemented PBC. If students have major grievances about the novel programme, it is unlikely that

they will be successful learners. Their problems need to be determined and effective solutions found to ensure that the PBC is viable.

4.3 Motivation of adults

Whether or not people can be persuaded to pay attention depends on their interests and attitudes. These, together with motivation have become the primary driving force for the student. Thus, motivation will determine whether learning will take place at all (Kidd, 1973: 101).

A student who is exposed to free, open, self-directed learning will be intrinsically motivated. He will be free to pursue his own grades and to test his own inferences. Since intrinsic motivation promotes questioning and productive thinking, students will be trained to analyse statements critically and to be open to new ideas and experiences (Kidd, 1973: 109).

The relative balance between intrinsic and extrinsic interest in a course and the committment to developing expertise in the profession will vary significantly between students and will influence the quality of studying (Entwistle, 1992:596).

Deci & Ryan (Tobias, 1994:38) has asserted that since people enjoy tasks that interest them, irrespective of whether they will be rewarded or not, the impact of interest is central to an understanding of the effects of intrinsic motivation. "Intrinsically motivated behaviour are those the person undertakes out of interest. From this perspective, interest and intrinsic motivation are virtually synonymous. Also, interest seems to be stable and long-lasting in adults.

It has always been assumed that people work harder and learn more on tasks related to their interests than on others. It is reassuring to note that recent research has confirmed this relationship (Renninger et al.in, Tobias, 1994:38).

Interest may have an energising effect on learning and lead students to use deep comprehension processes. According to Tobias (1994:50) research shows that interest also contributes to learning by leading to a greater use of imagery and may stimulate an emotional, personal and extensive network of relevant association .

The target group in this study comprise medical students and since learning in the PBC occurs in a clinical context, these students are likely to be more interested in their learning tasks than their counterparts in the conventional track.

4.4 Attitudes

Attitudes have cognitive, affective and action components. If one is concerned about an attitude towards a curriculum, one would inquire about how much the individual knows about the curriculum (cognitive), whether he dislikes, approves or hates the curriculum (affective) and whether his feelings are expressed directly or indirectly in action (Kidd, 1973: 115).

The origin and development of attitudes depends on several factors, namely, genetic factors, physiological state of the subject, the social group to which he belongs, his direct experience and the kinds of communication to which he is exposed. Attitudes are complex forms of response and may serve several functions in the emotional life of a person. Changes in attitude

can be brought about by decreasing the tension with which the person is affected. In changing attitudes, the self must be involved. This may happen through assuming responsibility to oneself and to others (Kidd, 1973: 116).

Entwistle's model described by Blunt (1992:43) implies that the prediction of a student's approach to a task, will depend on his perception of it and will therefore depend on the student's characteristics and attitude of the task itself. Entwistle in, Blunt (1992:43) claims that the student's approach to learning influences the way she processes the task. The deep, comprehension type learner integrates and summarizes the information while the achievement-type uses strategies that will bring rewards (Blunt, 1992:43).

In this study, the perceptions of students towards the PBC could be positive or negative. If it is negative, it could influence the students' approach to learning. An empirical investigation of the source of such tension could help in alleviating those problems and probably change negative views of the novel curriculum.

4.5 Synthesis

The Andragogical model for adult learning is based on the assumption that the adult learner will show certain characteristics towards learning. The "need to know" implies that adults will want to know why they are learning something before they endeavour to learn it. Also, adults will learn those things when it becomes necessary to implement that knowledge in real life situations. Their orientation to learning will depend on whether the knowledge or skill learnt, will be applicable to life.

On reaching adulthood, the adult will have a concept of being self-directing, that is, in charge of his own decisions. Adulthood would also have brought with it the richness of the learners' prior experience. Small group discussion, which is a manifestation of the PBC, provides an opportunity for students to share knowledge drawn from past experiences. This is an important source of information which cannot be derived from any textbook.

Unfortunately, experience can also mean that adults might be less open to change or new ideas, with older people being more rigid and inflexible in their ways. The transition to the new programme involves adapting to a considerable amount of change. This could spell disaster for someone who is not adaptable and could result in them harbouring contempt for the innovation.

Additionally, adults carry with them an abundance of feelings which could be unpleasant feelings about school. In this case, there would be an inclination to avoid new learning experiences, such as self-directed, student-centred learning imposed on by the PBC.

Furthermore, constant criticism of an adult would manifest itself in avoidance behaviour towards learning. Studies have shown that adults learn best when they are treated as adults and they are usually intrinsically motivated to perform tasks that interest them. The student-centred PBC ensures that students are the "main players" and that they are treated with respect. They are perceived and treated as self-determining adults, in charge of their own learning.

The relevance of the above is that the affective aspect of the adult learner has to be taken into account, considering that this

study is concerned with the perceptions of students towards the innovative curriculum. For example, the Andragogical model states that adults most readily learn something if it is relevant and applicable to real life situations. Therefore, in designing the questionnaire, a question on the relevance of the PBC will be included since students are most likely to have strong feelings about this aspect of the curriculum.

For example, students will be asked whether, being exposed to the PBC would make them more competent doctors. Also, there will be a question on whether the PBC has helped them relate basic science information to the clinical cases. In the open-ended question, they will be afforded the opportunity to express their opinions on the relevance of the new curriculum.

Older people are generally resistant to change, for example, curriculum changes, and this could have a bearing on the type of responses received from mature students in the class. Furthermore, if a student is generally interested in a particular task, he will be intrinsically motivated to learn that task and will most likely perceive learning and the new curriculum in a positive light.

Thus, a knowledge of the characteristics of adults towards learning provides the necessary affective background for this study which is based on their feelings, attitudes and beliefs towards a major change which has occurred in their academic lives, namely, a transition to the novel PBC.

An understanding of the adults' attitude and approach to learning is also imperative to the tutor of PBL, to avoid misunderstanding

and conflict in the classroom. Tutors, for example, will have to be aware of the needs of the adult learner and relate the relevance of what is being taught to how it can be used later in life. Unlike children, the adult learner will not learn something simply because the teacher wants him to. Therefore, guidelines for the facilitator of learning in the next section will be based on the aspects of the adult learner already discussed.

4.6 Guidelines for a facilitator of learning.

The tutor in the PBC will need to acquire new skills if he is to be a good facilitator. A discussion of what tutors should take cognisance of, is given below.

4.6.1 Creating a co-operative learning environment

The task of the facilitator is different from that of the lecturer in a conventional curriculum. The appropriate learning resources would have to be provided and self-study on the part of the student is of paramount importance. Once the problems have been selected by the teachers and presented to the students, he will need relevant books, journals (as well as other media) and teachers to approach as consultants (Wolff, 1979:396).

With respect to PBL, there must be a willingness on the part of the tutor to gain skills in the facilitation of student learning. The student should be assisted so as to integrate and use information, to solve problems and to interact co-operatively and effectively in a group. Thus, there is a challenge to create a co-operative learning environment for students (Kaufman, 1985: 47). Adult students, afterall, learn best in a warm, accepting

atmosphere where the self is not threatened. If a students is belittled by group members or the tutor, he will tend to avoid group interactions.

Knowles (1990: 79) maintains that the facilitator should remain alert to expressions that indicate strong feelings. These feelings may be those of anger, rivalry or affection. By being alert to these feelings expressed by the group, he could help to expose them into the open for constructive understanding and use by the group. It is important that these negative feelings caused by poor group dynamics, do not reflect on perceptions of actual implementation of the novel curriculum. Students might have a negative view of the curriculum, simply because of unpleasant experiences during tutorial sessions.

The facilitator needs to realize that only when he shares an equality with his students, as learners, can he participate as a member of the group. Also, there may be occasions when he finds himself suspicious of his students. There may also be times when he would be unable to accept viewpoints and attitudes which differ from his own. It is only when he is able to express these doubts of others, will there be significant interchange between himself and his students (Roger, in Knowles, 1990: 80).

An autocratic atmosphere, produced by a dominating teacher, instils in learners defiance, conformity and increasing dependence on authority. An authoritarian environment, characteristics of most conventional classrooms, destroys self-confidence and a healthy self-concept. On the other hand, an open atmosphere, which is what facilitators of learning should subscribe to, is more conducive to learner initiative, creativity and independence. All of this, cites Watson, (Knowles, 1990: 82), is equivalent to learning how to learn.

The PBC aims to provide an open, democratic atmosphere which is in keeping with its student-centred approach. The teacher-centred, autocratic approach of the traditional curriculum is not acceptable in the novel programme. Instead, the role of the tutor in the PBC is that of facilitator of self-directed learning.

4.6.2 The facilitating of self-directed learning

Ryan (1993:56), suggests that during the early stages, the tutor can play a dominant role in tutorial activity. Thereafter, having guided students towards self-direction, he could gradually reduce his dominance. As this process occurs, students can test their self-directed learning abilities, with regular feedback from the tutor.

One of the hallmarks of the PBC is self-directed learning, towards which every tutor is encouraged to strive. Therefore, students are slowly weaned from being dependent on the tutors' guidance, towards self-direction. Eventually, students would be able to conduct group tutorials even in the absence of the tutor.

Therefore, once tutors have presented or guided their students to new information, in a democratic atmosphere, they have a duty to stimulate rather than to enforce learning and their role as facilitators is important. One of Roger's hypotheses which stemmed from his student-centred approach to education, is that one cannot teach another person directly but only facilitate his learning (Rogers in Knowles, 1990:41).

This move towards self-direction is an application of the Andragogical model which suggests that adults have a

psychological need to be self-directing and would prefer to be in charge of their own learning, with some guidance from the tutor.

This model also implies that adults have accumulated an abundance of knowledge through past experiences and this represents a valuable learning resource.

4.6.3 Prior experience

Thus, also of importance is the fact that adult learners bring to the didactic situation an abundance of prior experience. Thus, adult education should focus on techniques that exploit the experience of the learners, for example, group discussion, problem-solving activities, laboratory exercises and case methods (Knowles, 1990:59).

Bates & Rowland in, Warham (1991:94) argue that there is tension between what we expect students to learn and the individual meanings we encourage them to create. This tension arises out of contradictory sets of criteria which forms the basis of our teaching. While the one is concerned with the student's framework of meaning, the other is concerned with moving the students beyond that framework. Tension increases when the gap between the students' frame of reference and our own, gets wider. Therefore, the most important skill of the tutor, according to Warham (1991:98), is to be attentive to the responses of the students. For example, Blunt (1992:44) explains that some students may perceive information as irrelevant or culturally alien and the tutor's task would be to relate that information to the students' experience.

This is more easily achieved in small group tutorial settings than in a lecture. Tutors in the PBC can get to know their

students on a more personal level and learn about cultural differences and frames of references of different students. This can be used as a point of departure for more meaningful exchange of knowledge.

Additionally, in order to encourage students to become "professionally literate", it is imperative for the tutor to have a specific agenda about the social , linguistic and cultural conventions towards which students must standardize their behaviour. This agenda must be presented as a "format of interaction" and can be more easily achieved during tutorial sessions.

4.6.4 Role playing

Menahem & Paget (1990:57), describe an interesting technique, namely, role play which can be used by tutors to help students develop an effective clinical reasoning process. The clinical tutor would briefly state the patients presenting problem and would then take on the role of the patient. He would also supply the relevant history which would explain the presenting symptoms, and would keep in mind a specific diagnosis. All the time the tutor would allow himself to be interviewed by the student. According to the above authors, this method worked very well with students who were also free to engage in lively discussion and debate as the tutor maintained his silence.

The crucial feature of this approach is the skill and confidence of the clinical tutor in maintaining his role as a patient without reverting to a teaching mode. Menahem & Paget (1990:60) maintain that the perceptions gained by the tutor in the role of patient can provide valuable feedback to the students in terms of their interpersonal and communication skills.

4.7 Characteristics of the ideal tutor.

Since this study deals with the perceptions of students towards a novel curriculum, it is important for tutors to show warm friendly qualities. Students would be undergoing considerable stress due to the changes in the curriculum from traditional to problem-based and would require much support. Also, the PBC in itself presents new challenges like the acquisition of self-directed learning skills, clinical reasoning skills and becoming acquainted with new methods of teaching and learning.

The role of the tutor in this new didactic situation will also undergo redefinition. They will have to shed their authoritarian ways and teacher-centred approach of the traditional curriculum, in favour of a more democratic, student-centred approach. On a specific level, what are the exact characteristics a tutor should possess to be an effective facilitator of the learning process?

Tough, (Knowles, 1990: 83-84) describes the ideal helper as warm and loving, and who cares about the learner and his problem. He is willing to spend time helping., He is encouraging, supportive and friendly. He accepts the learner as an equal and as a result the learner feels comfortable to engage in conversation with them in a relaxed atmosphere. Also, the ideal tutor has confidence in the learner's ability to manage and control his own learning and does not wish to impede the learner's skill as a self-planner.

Furthermore, the helper or tutor listens, understands and responds. He is interested in the other person as a person and not as an object. His interaction with the learner is that of

true dialogue - an encounter in which he listens and talks. He has no intention to want to manipulate, dominate or control the learner (Tough, in Knowles, 1990: 84).

The ideal tutor is an open person who is not static, defensive, negative or suspicious of others. He sees himself as a learner. He tends to be spontaneous and authentic and feels confident enough to behave as a unique person (Tough, in Knowles, 1990: 84).

It is only through an exhibition of good human qualities that tutors can hope to gain the trust and respect of other members in the group. If students are shown respect, they will respect in return. Although they will regard the tutor as an equal, they will respect him as an authority in his field. Therefore, there will be inequality-in-equality and this will form the basis for co-operative learning in a group.

4.8 Co-operation within the group.

Once an open, caring atmosphere has been created within a group, this will quickly give rise to mutual respect and co-operation. A manifestation of PBL is open debate and discussion, and group members will be able to engage in healthy discussions which will lead to improved learning.

According to Barrows & Tamblyn (1980: 73), the sharing of mutual support and criticism given openly, is vital to the success of PBL. A student can complement and reinforce the others in the group once he has become aware of other students' backgrounds and their individual learning habits. Each must feel responsible if the group process becomes non-productive. The responsibility of

each member of the group helps the students develop their personal ability to evaluate their own abilities and to work constructively with others.

The student should be able to demonstrate communication skills with respect to interpersonal skills and the ability to build a team relationship with other students. He should be able to show insight and constructive self and peer criticism (Kaufman, 1985: 14). Additionally, students should gain skills in using the group for emotional support, social interaction and personal growth (Kaufman, 1985: 46).

The above skills are stated in the list of aims of the PBC in Chapter 1 (see 1.4.3), and are important when describing co-operative learning which is a feature of the PBC. These skills will be useful in the students' professional life after he graduates, when he finds that he will have to survive as a member of a group and that he cannot function entirely on his own.

4.9 Synthesis

Certain important assumptions about adult learners form the basis about modern adult learning. Adults have a great deal of previous experience which can be used effectively in the didactic situation. Adults also have a deep need to be treated as adults and to be self-directing. They are motivated to learn as they experience needs and their orientation to learning is life-centred. They need to know why they have to learn something unlike children who have to learn what the teacher wants them to.

Adults generally have qualms about change and tend to be more rigid in their ways. This has to be taken cognisance of when

planning a novel curriculum. Adult learners are motivated by tasks which interest them and which have relevance to life-situations. Their attitude towards a task will influence their perception towards it and their attitudes towards their education will determine whether they will be successful learners or not.

Therefore, a knowledge of the assumptions about adult learners and adult learning together with their feelings and attitudes in the didactic situation will help the facilitator of learning, in the PBC or any other curriculum for that matter, to be alert towards strong feelings expressed by the group. He should try to subscribe to an open, accepting, democratic atmosphere that is conducive to learning. The ideal tutor exhibits good human qualities such as empathy, friendliness, warmth and understanding.

Additionally, the feelings and emotions of the adult learner will have a bearing on his motivation to learn and will influence his perception of the learning environment. If the learning environment is open and accepting, which is what the PBC strives towards, the student might have a different perception of the implementation of the curriculum as compared to when the tutor acts as an authoritarian who belittles and dominates him.

In the context of this study, the feelings, emotions and general perceptions of the students at Unitra towards the PBC will be assessed. The following chapter focuses on the empirical aspect of this study. That is, the designing and drawing up of the questionnaire is outlined, and the method of investigation is explained. The results of the research are discussed in detail with respect to the open-ended and structured questions. A comparison is given of the pilot and final studies. In this way the affective domain of PBL is investigated.

CHAPTER 5 :

EMPIRICAL STUDY

The previous chapter concentrated on the feelings, attitudes and perceptions of students regarding the didactic situation in general and the teaching-learning situation of the PBC in particular, and how these factors can affect the academic performance of students. In this chapter, an empirical investigation is undertaken to determine in an objective and scientific way, what the students' feelings, attitudes and perceptions are towards the innovative curriculum , recently implemented at Unitra. A questionnaire is administered and the responses analysed. In this way the aim of the study, which is to determine the perceptions of students towards the PBC as compared to the traditional curriculum, will be realised.

5.1 Aims and reasons for the study

As was discussed in Chapter 1 (see 1.3.3), the aim of conducting an empirical investigation into students' perceptions towards the PBC as compared to the traditional curriculum is to determine in an objective and scientific way what the feelings and attitudes of the target group are, regarding the inception of the novel programme. The empirical study will also be in keeping with the democratic atmosphere which the PBC aims to provide.

5.2 Significance of the study

On the basis of the results of the investigation, certain aspects of the new curriculum could be altered accordingly. The reason

is that students who view the programme in a negative light would be discouraged and disillusioned and this could reflect on their academic performance. Furthermore, the PBC is student-centred and the perceptions of students towards the innovation is of paramount importance in ensuring the viability of the curriculum. An empirical study will make it possible for information to be collected for further planning of the novel programme and to evaluate the effectiveness and efficiency of its implementation.

5.3 Methods and Instruments used in the study

The method used in the empirical study is the administering of a questionnaire consisting of both open-ended and structured questions (see Annexure). The entire second year class of 1993 and 1994 comprised the target group. Completed responses were collected and analysed. The open-ended items will be analysed to give an overall perception of the two curricula.

In the following subsection, the designing and drafting of the questionnaire will be discussed in greater detail.

5.4 Designing of the questionnaire

5.4.1 Type of statements

Stritter, in Mc Guire, Foley, Gour & Richards (1983: 294-318) suggests that the reason for the problem that there are so few articles on faculty development, is that the experiments were too qualitative or too quantitative, leading to oversimplification.

Therefore, the methods used in this research are qualitative to ensure that an objective, quantifiable and statistical

measurement is obtained. The research would also be quantitative in nature so as not to oversimplify the problem. Important, complex issues could be handled by use of open ended questions.

Behr (1988: 157) also states that a good questionnaire should contain both open and closed forms of questions in order that responses from both forms be checked and compared. According to Bailey (1982: 123), the advantage of structured questions is that the answers are much easier to code and analyse, and since the answers are standard, they can be compared from person to person. Unstructured questions allow the respondent to answer adequately and to qualify their answers. They impose no restrictions on the respondent's response.

Thus, the questionnaire used in this study consists of both structured and unstructured questions. The questions on student perceptions in the questionnaire relate to the hypothesis which suggests that the majority of students have no signifcant differences in attitude towards the traditional curriculum and the new problem-based curriculum (see 1.2).

5.4.2 Likert Scale

The Likert Scale was adopted in designing the questionnaire. This is a five-point scale in which the interval between each point on the scale is assumed to be equal. Respondents are usually asked to agree or disagree along a five-point continuum: strongly agree (SA), agree (A), undecided (UD), disagree (D), and strongly disagree (SD) (Tuckman, 1988: 92).

This scale is used in this study to register the extent of agreement or disagreement with a particular statement of a perception. In this research, however, a four-point scale was

considered since the option "undecided" might be seen by some students as an opportunity to be neutral or to avoid committing themselves. Thus, the respondents in this investigation would indicate their perceptions choosing one of the following: SA, A, D, SD.

The scale was built by first identifying the areas of perception (or subtopics) included within the topic of perception towards the PBC and the traditional curriculum. Some questions for each subtopic were written in a positive direction, that is, in favour of the PBC and others in a negative direction, that is, against the PBC. A positive question was scored by the following key: SA=4, A=3, D=2, and SD=1. A negative question was scored by the following key: SA=1, A=2, D=3 and SD=4.

The reason for reversing the scoring of negative questions was to provide a total score that reflected positiveness towards the object in question (Tuckman, 1988: 192). Thus, responses would be scored such that higher scores reflect more positive attitudes towards PBL.

5.4.3 Development and drafting of statements.

The questions were developed from information gained by reviewing the relevant literature and conducting personal interviews with students. The sections in the questionnaire (see Annexure), are manifold:

* Student characteristics in relation to curriculum changes (Questions 1 and 3).
* Student knowledge, comprehension and attitudes related to curriculum content (Questions 2,7,26 and 28).
* Student perceptions, beliefs and concerns about curriculum and implementation (Questions 4,11,12,13,14,15 and 16).

* Perceptions towards self-directed learning (Questions 17,18,19 and 20).
* Group tutorials as a novel method of teaching and learning (Questions 10,21,22 and 24).
* Tutors as facilitators of learning (Questions 23 and 25).
* Relevance to life of the PBC (Questions 5 and 8).
* Motivation of students towards the new curriculum (Questions 6 and 9).
* Competence in clinical reasoning skills (Questions 27,29 and 30).

In drafting the questions, the principles of questionnaire design were adhered to, namely,

* The questions were brief, to the point and not too numerous.
* They were presented in a definite order from simple (factual) to complex (difficult).
* Questions were unambiguous - there were no double - barrelled questions.
* Questions did not question social standing or ethics.
* Statements were relevant to the perception construct being measured.
* Statements were not factual but were expressions of desired behaviour.

A draft copy of the questions were given to five colleagues familiar with questionnaire design, for comments and suggestions. Additionally, the questionnaire was administered to ten students to determine whether the questions could be easily understood. The necessary changes were made before the final questionnaire was drawn up.

5.5 The Pilot Study

According to Bailey (1982:150) a draft questionnaire can be administered to few respondents so that mistakes can be rectified before the final study is done. The respondents in the pretest are asked to make a critical analysis of the items in the questionnaire, for example, questionnaire wording, question order, redundant questions, ambiguous questions or anything else about the questionnaire that they find inadequate.

If everyone answers a question positively, there will be no correlation because everyone agrees - therefore that question would be eliminated. If all the opinions are really constant, there will be no statistically significant relationship as all answers will be constant in a few categories instead of just in one. Also, respondents will often qualify or clarify their answers in a pretest. These help the researcher to refine question wording and response categories for the final questionnaire.

In this study a pretest or pilot study was done by giving 10 respondents, who were randomly selected and were representative of the target group, the draft questionnaire to fill in and to make alterations, comments and / or suggestions. This questionnaire (see Annexure) consisted of 30 structured statements and an open-ended question. When the responses were returned, there were no major changes to the questionnaire, save for a few typing errors. The questions were answered differently by each student, that is, no one answer was agreed to by everyone and thus, there was no need to eliminate any question. Students also understood the statements as they were put across simply and concisely. Therefore, it was decided to retain all the items in the questionnaire and to use the questionnaire, as is, in the final study.

5.6 The Final Study (1993)

5.6.1 The target group

The target group consisted of the second year medical students at Unitra. These students were the only group being exposed to the novel PBC at the time of this study. Students in the other years still followed the traditional curriculum.

5.6.2. Modus operandi of the 1993 study

The questionnaire was administered to the entire MBChB II class comprising 37 students. The returning of the responses was prompt although some students had to be coerced into completing and handing in the questionnaire. Thirty-two (86%) completed questionnaires were received. Generally, students were very co-operative and took the study seriously.

5.6.3 Results of responses to structured questions

The mean score for each item was determined by finding the total score of the responses for all 32 students and then dividing by 32. The mean score was calculated to seven decimal places (see TABLE 3). If the number after the decimal was greater than five, the next whole number was taken. For example, 2,6333333 becomes 3. In a negative statement, the value 3 is assigned to the perception disagree. Therefore, the overall perception is that students disagree with that particular statement.

If the number after the decimal is less than five, the previous whole number is taken. For example, 3,1612309 becomes 3, which for a positive statement, is agree. Thus, students agree to that statement.

In this way the mean score with respect to all 30 items in the questionnaire was calculated. This mean score gave an indication as to whether the students agreed or disagreed with a statement which expressed a particular perception.

TABLE 3 gives the average score and the students' perception with respect to each item in the questionnaire. As can be seen from the table, students generally agreed or disagreed to the statements. Some students did not answer certain items resulting in the changes in the denominator.

POSITIVE OR NEGATIVE QUESTION	QUESTION NUMBER	TOTAL SCORE	MEAN SCORE	PERCEP-TION
-	1	51	51/31 = 1,6451612	A
-	2	79	79/30 = 2,6333333	D
-	3	82	82/31 = 2,6451612	D
-	4	87	87/31 = 2,8064516	D
+	5	94	94/32 = 2,9375000	A
+	6	98	98/32 = 3,0625000	A
-	7	79	79/31 = 2,5483870	A
+	8	98	98/31 = 3,1612903	A
+	9	93	93/31 = 3,0000000	A
+	10	95	95/32 = 2,9687500	A
+	11	83	83/32 = 2,5937500	A
-	12	64	64/31 = 2,0645161	A
-	13	101	101/32= 3,1562500	D
-	14	59	59/31 = 1,9032258	A
-	15	82	82/31 = 2,6451612	D
-	16	73	73/31 = 2,3548387	A
-	17	74	74/30 = 2,4666666	A
+	18	96	96/32 = 3,0000000	A
-	19	78	78/32 = 2,4375000	A
+	20	90	90/32 = 2,8125000	A
+	21	93	93/30 = 3,1000000	A
+	22	102	102/32= 3,1875000	A
+	23	85	85/27 = 3,1481481	A
+	24	96	96/32 = 3,0000000	A
+	25	78	78/26 = 3,0000000	A
-	26	76	76/32 = 2,3750000	A
-	27	71	71/29 = 2,4482758	A
-	28	67	67/31 = 2,1612903	A
+	29	104	104/31= 3,3548387	A
+	30	101	101/32= 3,1562500	A

TABLE 3 : MEAN SCORE AND THE PERCEPTION OF STUDENTS (1993) WITH RESPECT TO THE STATEMENTS IN THE QUESTIONNAIRE

5.6.4 Analysis and interpretation of mean scores to questionnaire

Students agreed that the change to the PBC was very stressful (Question 1) and that the volume of information they had to handle was overwhelming (Question 7). They disagreed that the PBC had destroyed their self-confidence (Question 3). There was consensus that the PBC has made them want to learn more than is expected of them (Question 9).

In this writer's estimation:

> This serves to indicate that the respondents were undergoing a certain level of stress related to learning. This created dissonance which motivated them to work harder to remove the uneasiness. For most students, the stress was not so great, so as to destroy their self-confidence or render a feeling of worthlessness.

Students felt that, being in charge of their own learning was a good experience (Question 20). At the same time, they agreed that learning on their own is very frustrating (Question 17) and that learning in groups is an effective way to gain knowledge (Question 22). Furthermore, they preferred to be taught by their peers rather than their lecturers (Question 23). Their perception towards attending tutorials was favourable (Question 21). They agreed that the PBC has encouraged greater interaction among students (Question 10) and that they are able to interact well on an interpersonal level with members in their tutorial group (Question 24).

Tutors were considered to be good facilitators of group discussions (Question 25). All this point to the fact that students' experience with group tutorials are positive.

Students found the PBC to be intellectually more stimulating than the traditional curriculum (Question 6). While they felt that the PBC should be run together with the traditional curriculum (Question 12) they did not feel that the PBC should be abandoned (Question 13). There was disagreement that the knowledge gained with the PBC was less than if they had been exposed to the traditional curriculum (Question 2). There was censensus that the PBC was instrumental in preparing them better to solve medical problems (Question 8). In this regard, it is evident that students view the PBC in a more favourable light than the traditional curriculum.

Students agreed that learning Biochemistry and Physiology through the PBC is more difficult (Questions 14 & 16). A similar sentiment towards Anatomy was not present (Question 15). The examination methods used in the PBC were perceived to be satisfactory (Question 11). Although students agreed that they were willing to look up information for themselves (Question 18), they also preferred to have lectures on all the learning issues (Question 19). They were also of the opinion that there should be fewer learning issues for each case (Question 28).

It can be argued that while students were motivated enough to want to look up information on their own (self-directed learning), they were becoming frustrated. This could be attributed to the problem of understanding certain difficult concepts (mainly in Physiology and Biochemistry). This problem seems to be compounded by the fact that the volume of information and knowledge they are required to master, is so great and time-consuming.

Faculty has already been aware of this problem (which has been objectively and scientifically verified in this study) and have been giving lectures in areas of difficulty in Physiology and Biochemistry.

When the responses to the statements pertaining to the clinical cases were analysed, there was a general perception that the cases were too clinically orientated and difficult to analyse (Questions 26 & 27).

Respondents felt that a medical student who is exposed to the PBC is bound to be a more competent doctor (Question 5) and that it is not only the bright students who would benefit from the novel curriculum (Question 4) . There was consensus on the perception that the PBC has helped them to relate their basic science knowledge to the clinical cases (Question 29). From their point of view, the PBC has been successful in helping them work out clinical problems and deriving hypothesis (Question 30).

The following section deals with student's responses to the unstructured or open-ended questions.

5.6.5 Analysis of responses to open questions

Students were asked to comment on the disadvantages, advantages, merit, viability and relevance of the PBC as compared to the traditional curriculum.

5.6.5.1 Merit

Responses received from students varied considerably: "better than the traditional curriculum", "quite good", "bad", "fair", "not good", "tops - but not perfect yet", "very good" and "very bad".

5.6.5.2 Viability

Generally, students have expressed optimism for the PBC and feel that with time, and resolution of the "teething problems", the PBC is very "recommendable".

Some students believed that it will only be viable if it is run together with the traditional curriculum, otherwise it would not survive on its own. Others felt that the system would be viable if there are more media available, namely, computers, videos, textbooks and so forth.

Students don't seem to have any qualms about the PBC but feel that more planning and more efficient implementation is essential if it is to survive in years to come.

5.6.5.3 Relevance

According to the students, the PBC gives an indication as to why the basic sciences are important and how they can be related to the clinical cases. Since the PBC entails the solving of clinical problems, it exposes the student to the idea of being a doctor - "the system trains us to reason clinically". Students also felt that they were "better equipped to tackle medical problems", having been exposed to the PBC. Respondents acknowledged that since the PBC is also community-orientated, what they learn has a bearing on the community they will eventually work within.

Some students were of the opinion that the knowledge they are being exposed to in one year, does not have immediate relevance and will only be used in years to come. Thus, they don't see the point of having to cover this information right now.

5.6.6 Students' perceptions regarding the advantages of the problem-based curriculum

Students described the PBC as exciting, challenging and interesting. They also stated that the present curriculum

"strengthens leadership qualities", "stimulates an interest to learn" and "encourages interaction among students."

The greatest advantage is that it inculcates a sense of independence in students. "It enables students to become independent at an early stage." Additionally "it improves the ability to express oneself" and for some students it enhances self-confidence.

Another advantage described by the respondents is that this curriculum allows for greater interaction among students and between lecturers and students. Thus, it provides a good opportunity for the lecturer to get to know the students on a one-to-one basis and for the students to work together as a team. Lecturers were described as "more involved with the students and more approachable."

Furthermore, with this system, students felt that they were given a chance to think as clinicians. "You get exposed to the clinical aspects right from the beginning." They were also satisfied that the three basic sciences were integrated and that they could relate this knowledge to clinical cases. Students also felt that by being exposed to the clinical reasoning process, namely, derivation of hypotheses and learning issues, they were being guided so that they would eventually be able to solve real cases. "It would make me a better doctor."

Of self-directed learning, students made comments like: "information found on your own is not likely to be forgotten easily." They also felt that the PBC makes them "learn to think critically." They were also able to critically evaluate themselves with respect to their own strengths and weaknesses, with this system.

5.6.7 Students' perceptions regarding the disadvantages of the problem-based curriculum

A summary of the grievances and problems experienced by students regarding the innovative programme, is given below.

5.6.7.1 Tutors

According to the students, a fundamental problem of the PBC derives from the fact that tutors of different specialities are not evenly distributed among the groups. The feeling was that different groups would have different depts of knowledge leading to inconsistencies in knowledge acquired. Also respondents complained that tutors tended to emphasize their fields and neglected the other subjects.

5.6.7.2 Volume of information

Another grievance was that too much information has to be tackled which is sometimes irrelevant for a second year student. Furthermore, the learning issues generated for every case were too numerous to cover in a short space of time. "We are just learning for the sake of presenting in the tutorials." This suggests that the material is covered but not properly understood. Thereafter, students tend to forget almost all they have read. They also felt that they had little time for revision in-between cases.

5.6.7.3 Lack of guidance

Students also had qualms about the fact that their problems were not being adequately addressed by faculty. For example, at the beginning of the year, they had asked to be guided and advised on the depth of knowledge required for Biochemistry and Physiology. They felt that nothing had been done, in this regard.

There was also a general sentiment that they were not being given proper guidance and have lost their sense of direction with this system. They suggested that the minimum level of knowledge required of them be more clearly defined and that more lectures be given in difficult topics. They still felt that lectures are an integral part of the learning process especially since Biochemistry and Physiology was difficult for them to learn on their own. These perceptions are consistent with the results achieved with the structured questions (see Questions 14, 16 and 19).

5.6.7.4 Self-confidence of students

Analysis of the structured questions on student self-confidence (see Question 3) revealed that students agreed that they had not lost their self-confidence with the implementation of the PBC. Responses to the unstructured questions showed that some students were experiencing a sense of despair and were not feeling very confident because of their poor performance in the examinations. Others maintained that the system had improved their self-confidence. These perceptions were probably balanced out, giving the results obtained when the structured statement was analysed.

5.6.7.5 Time constraints

Students also expressed concern that the PBC is very time consuming and opted for the academic year to start earlier. Faculty is already aware of this problem and the 1994 academic year started earlier and finished later than usual, to ensure that adequate time is had to cover all the cases comfortably. The pace during 1993 was indeed very accelerated and quite unbearable.

Students have grievances about the examination time-table because it is so "cramped", leaving them little time between subjects to study.

As a result, they experienced undue stress and tension during the examination period. Again, this is a reflection of the limited time available to complete the PBC adequately, which necessitated the writing of examinations in a short space of time.

5.6.7.6 Transition to the new curriculum

A large number of respondents felt the change to the new curriculum to be very drastic and abrupt and stated that they needed time to adjust. Some would have preferred a gradual transition period while others suggested that students should be orientated at the beginning of the year. Respondents found the change, the hectic pace and the heavy workload to be very stressful. This is in keeping with the result obtained for the structured question on stress (see Question 1).

5.6.7.7 General comments

In the open-ended questions, some students didn't feel that they would become more competent doctors having been exposed to the PBC. They were of the opinion that students who went through the traditional curriculum had been given more guidance, would know much more and would be better doctors.

Other general comments about the PBC included: "The system is not well organized yet"; "the basic science knowledge is sacrificed at the expense of understanding clinical problems and "I don't feel confident enough about my knowledge and understanding of the basic science subjects."

5.6.8 Synthesis of final study (1993)

Students' description of the PBC ranged from very good to very bad. They felt that the novel curriculum is more relevant since it trains them to reason clinically and the basic science knowledge is related to the clinical aspects.

Students were of the opinion that the new curriculum is exciting , stimulating, encourages independence and motivates them to learn. It also allows for greater interaction among students and lecturers. Students were satisfied that they were being taught to think critically and were being exposed to relevant information which would hold them in good stead to becoming better doctors. Respondents also welcomed the experience to engage in their own learning but sometimes found this to be very frustrating. Thus, learning in groups was also preferred as it gave them the opportunity to exchange knowledge and ideas.

Among the disadvantages listed were inconsistencies in knowledge acquired and bias among tutors who favoured their own fields. Additionally, the volume of information to be learnt was overwhelming and time was a major constraint. In this respect, the changeover was perceived to be extremely stressful. Some students even felt despondent and aimless. Biochemistry and Physiology, especially, were considered difficult for them to learn on their own.

Another perception of the majority of respondents was that the new curriculum is viable if its implementation were to become more efficient, for example, increasing available media. Nevertheless, the PBC was considered to be more stimulating than the traditional curriculum and students did not feel that the new curriculum should be abandoned.

5.7 A follow-up study (1994)

A similar study to that conducted in 1993 was also done in 1994 and is termed the follow-up study.

5.7.1 Aims and reasons for the follow-up study

The aim of doing a follow-up investigation of students' perceptions towards the PBC as compared to the traditional curriculum is to determine whether the perceptions of students' in the class of 1994 are similar to or different from those in the 1993 group. Furthermore, from the results of the 1993 study, certain aspects of the curriculum were changed, for example, more lectures were given in Biochemistry and Physiology. A follow-up study would enable faculty to determine whether the changes were satisfactorily done.

Additionally, different students have different personalities and aspirations and one cannot expect a single study to give a complete picture of the successes or failures of a curriculum. Any curriculum is never static but always changing, especially with respect to the target group, and therefore evaluation should be an on-going procedure. Thus, the feelings, perceptions and attitudes of different groups of students should be taken cognisance of so that meaningful changes can be effected.

5.7.2 Modus operandi of the 1994 study

The same questionnaire used for the 1993 study (see Annexure), was also administered to the entire MBChB 11 class of 1994, comprising 44 students. In this way the responses of both target groups could be more easily compared. Also, it could be determined whether certain aspects of curriculum implementation

had improved in the second year, based on the responses received in the 1994 study.
Thirty four completed questionnaire were received giving a response rate of 77%.

5.7.3 Results and Discussion

The completed questionnaires were analysed and the results discussed below.

5.7.3.1 Responses to structured questions

The mean score for each item was determined in the same way as was done in 1993 (see 5.6.3). The only difference was that the mean score was obtained by dividing the total score by 44, this being the total number of students in the class. TABLE 4 gives the average score and the students' perception with respect to each question. The changes in the denominator are due to students not answering certain questions.

POSITIVE/ NEGATIVE QUESTION	QUESTION NUMBER	TOTAL SCORE	MEAN SCORE	PERCEPTION
-	1	57	57/34=1,6764706	A
-	2	105	105/34=3,0882353	D
-	3	94	94/33=2,8484848	D
-	4	99	99/33=3,0000000	D
+	5	106	106/34=3,1176470	A
+	6	110	110/34=3.2352942	A
-	7	78	78/31= 2,5161290	A
+	8	108	108/34=3,1764706	A
+	9	93	93/33=2,8181818	A
+	10	106	106/34=3,1176470	A
+	11	77	77/33=2,3333333	D
-	12	78	78/33=2,3636364	A
-	13	95	95/32=2,9687500	D
-	14	60	60/34=1,7647059	A
-	15	95	95/34=2,7941176	D
-	16	93	93/34=2,7352941	D
-	17	91	91/34=2,6764706	D
+	18	94	94/34=2,7647059	A
-	19	85	85/34=2,5000000	A
+	20	79	79/34=2,3235294	D
+	21	101	101/33=3,0606061	A
+	22	105	105/33=3,1818182	A
+	23	71	71/32=2,2187500	D
+	24	107	107/34=3,1470588	A
+	25	100	100/34=2,9411764	A
_	26	81	81/34=2,3823529	A
_	27	88	88/34=2,5882353	D
_	28	78	78/33=2.3636363	A
+	29	110	110/34=3,2352941	A
+	30	110	110/34=3,2352941	A

TABLE 3: MEAN SCORE AND THE PERCEPTIONS OF STUDENTS (1994) WITH RESPECT TO THE STATEMENTS IN THE QUESTIONNAIRE.

5.7.3.2 Analysis and interpretation of mean scores

Students agreed that they found the change to the problem-based curriculum to be extremely stressful (Question 1). They disagreed that the PBC has destroyed their self-confidence (Question 3) and perceived the new programme to be intellectually more stimulating than the traditional curriculum (Question 6). There was consensus that a medical student who is exposed to to the PBC is bound to be a more competent doctor (Question 5). Also, students did not feel that the PBC only benefits brighter students (Question 4).

There was disagreement that the knowledge gained with the PBC was less than if they had been exposed to the traditional curriculum (Question 2). Nevertheless, students felt that they are lost in a jungle of information and can't get out (Question 7). This would serve to indicate the sense of despair experienced by students.

Respondents concurred that PBL prepares them better for learning to solve medical problems than the traditional curriculum (Question 8) and that the former has made them want to learn more than is expected of them (Question 9). In this regard, it is gratifying to note that (most) students are intrinsically motivated.

There was a perception that the PBC has encouraged greater interaction among students (Question 10) and that they are able to interact well on an interpersonal level with members in their groups (Question 24). They agreed that learning in groups is an effective way to gain knowledge (Question 22), but disagreed that learning from their peers is more effective than learning from their lecturers (Question 23).

Students were dissatisfied with the examination methods used in the PBC (Question 11). While they agreed that the PBC should be run parallel with the traditional curriculum (Question 12), they did not feel that the PBC should be abandoned in favour of the traditional curriculum (Question 13).

Learning Biochemistry through the present curriculum was perceived to be more difficult (Question 14). On the other hand, learning Anatomy and Physiology through the new programme were not considered to be more difficult (Questions 15 & 16). Students were willing to spend time looking up information for themselves (Question 18) and did not find learning on their own to be frustrating (Question 17).

They disagreed that being in charge of their own learning was a terrific experience for them (Question 20) and preferred to be given lectures on all the learning issues (Question 19). They also felt that there should be fewer learning issues for each case (Question 28). This implies that while students are prepared to be engaged in self-directed learning, they still preferred to have guidance and support in the form of lectures.

Students look forward to attending tutorials (Question 21). There was consensus that tutors are good facilitators of group discussions (Question 25). The clinical cases were perceived to be too clinically orientated (Question 26) yet not difficult to analyse (Question 27). Respondents agreed that the problem-based curriculum has helped them relate what they have learnt in the basic sciences to the clinical cases (Question 29) and to enable them to work out clinical problems and derive hypotheses (Question 30).

5.7.3.3 Responses to open questions

(a) Merit

Some students described the novel curriculum as being "terrible" and "not good", stating that they never have time to study properly and cannot really grasp the concepts covered. To this end, the present curriculum was criticised as being worse than the traditional curriculum. There were also suggestions that the examination methods be reviewed. Other students gave favourable comments, claiming the new programme to be "excellent", "the best" and "a good system of good quality".

b) Viability

Many respondents expressed the sentiment that the PBC has a great future and that if run the correct way, it should continue. There was also the feeling that if students are positive and more involved with the new programme, it would be viable.

Therefore, students in general, are of the opinion that the innovative curriculum is viable especially if their input and attitude is positive and if implementation is effective and efficient.

c) Relevance

Students see the novel curriculum as being very relevant as they have encountered some of the paper cases handled in tutorials, during their vists to peripheral hospitals, that is, during COBES (Community-Based Experiences and Services).

They were also of the opinion that the new community-orientated curriculum encourages students to work and interact with the community.

"Relevant curriculum - particularly in our part of the country where our masses are rural people, therefore being trained to cope for any medical school and exposure to peripheral hospitals helps us to realize what kind of doctors we must be-to serve the community and underprivelaged". "It takes the service to the people, that is, the forgotten majority of the rural areas". This perception is constrasted by the perceptions of a few who said that the present system only helps solve problems clinically.

Another sentiment was that the cases and learning issues are relevant to the standard of education at second year level, that is, they cover all the anatomy, biochemistry and physiology in the cases. There seems to be mixed feeling on this issue as some respondents remarked that while the cases were relevant, the learning issues or procedures were not.

Some students stated that this curriculum would be more relevant in the clinical years when one deals with actual patients and that it is "irrelevant at second year level." Other students, in the majority, felt otherwise and claimed that the basic sciences make more sense because they are made relevant to clinical situations. Also, according to them the cases being tackled now serve as an introduction to more advanced clinical cases that they will encounter in the future.

5.7.3.4 Students'perceptions regarding the advantages of the problem-based curriculum

Students listed numerous advantages of the problem-based curriculum claiming that it helps them to interact freely with their peers and that it encourages teamwork and good interpersonal relations. They were also satisfied that they were receiving individual attention.

Another advantage cited was that they were being exposed to clinical reasoning and clinical skills at a very early stage. "It prepares us at an early stage to relate and always marry basic sciences importance to clinical reasoning and application." Additionally, "We learn to do the physical examination before reaching clinical years" and "we learn to hypothesise the problem of a patient at an early stage". Some respondents described a "new-found ability to solve problems" and the "opportunity to think clinically."

Further positive features of the new programme is the sense of independence and responsibility it inculcates in students, as can be ascertained by these remarks:

"It gives me a chance to find information for myself" and "it makes us take responsibility for our own learning." Students stated that they have confidence in themselves and did not have to rely on spoonfeeding. "I find myself being more interested even in disease higher than my level." " Stimulates one to read and to be hungry for more knowledge."

This highlights the intrinsic motivation many students experience because of the drive to learn more than is expected of them.

This writer has found that it is not uncommon to get students who approach resource persons at other universities and hospitals, for assistance.

"Interesting, challenging" and "allows students to think independently", was how the innovative curriculum was described.

"As we go on, we will be more acquainted to clinical problems and would relate what we do in tutorials to what we meet in hospitals." "We are trained to be doctors and not bookworms" Respondents saw COBES to be a great advantage as it allows the student to be exposed to the community much earlier than they would have in the traditional system.

5.7.3.5 Students'perceptions regarding the disadvantages of the problem-based curriculum

(a) Time constraints

A major complaint about the problem-based curriculum is that it is very time consuming. "There is a lot to learn in a very short time. There is no time for studying". Respondents claimed that they do not understand many of the learning issues and the few that they have understood is easily forgotten. This is probably due to the fact that there is limited time for consolidation and revision. Indeed, many respondents felt that since there was so little time in-between tutorials that they did not get an opportunity to prepare thoroughly.

(b) Demands on students

Another disadvantage listed was that the new programme is so stressful, demanding and taxing on students.

"Sometimes the work becomes strenuous such that you sleep for only two hours a night". "There is no time for some important activities outside academic life". "It needs an extremely hardworking student".

(c) Clinical aspects

Some students were concerned that that there is so much emphasis on clinical aspects that the basic sciences were being compromised. Subsequently, their knowledge of the basic sciences was not on a par with students following the traditional system. Furthermore, self-directed learning

did not always ensure that they would have mastered their work. "It is extremely frustrating for students to go over dozens of books in search of information that could easily be covered in a single lecture and even after this their understanding of the information is far less than what it would have been under the traditional system".

(d) Information overload

Several respondents claimed that they were spending a lot of time going over learning issues but were forgetting this information, could not understand it or found out later that it was irrelevant. This is probably why they did not consider being in charge of their own learning, a good experience (Question 20).

There was also a grievance that they are "confused as to what to learn and in what depth". Students also felt that they would concentrate on a certain learning issue only to discover that it is not important.

(e) Tutor distribution and competence

"Some students have good tutors while others have useless tutors". This comment sums up the feeling of a large majority of students who feel they are at a serious disadvantage because of the type of tutor they might end up with. Another problem was that there would be a lack in uniformity of knowledge acquired during tutorials because of the lack of uniformity in tutor specialists. For example, students feel that they would not know what Physiology is expected of them if they don't have a physiologist in their group. Even then, they felt that they would be benefitting little with respect to Anatomy. An additional disadvantage to the students is that tutors tend to emphasise or favour their subject fields. "Some tutors are not interested when students are presenting learning issues that are outside their subject field".

(f) Examinations

Students also have grave misgivings about the way examinations are conducted and felt that they were subjective and unfair. "The examination methods are as fair as chimney soot." "There is no way of judging students fairly". "There is a lack of consistency in different examiners. I feel examiners should be given clear guidelines as to what the student is expected to know".

This was in reference to the IPA (Individualized Process Assessment) where students felt that they should be given a chance to present the learning issues they had derived. There was a general sentiment that they were being asked different questions leading to inconsistencies in marks

obtained. Some students who were generally very good were getting marks lower than or comparable with weaker students, depending on who their examiners were.

It was remarkable how many respondents stated that the evaluation methods were unfair and that there was an element of bias in the assessment of students. This perception corresponds to the structured questions (Question 11) where students disagreed that they were satisfied with the examination methods.

(g) General comments

That the same cases were being used from 1993 and that students would already have had access to these cases before the tutorial, was another limitation cited. This defeats the purpose of inculcating clinical reasoning skills.

Additionally, students felt that they were being "thrown into the deepend because they haven't been exposed to the basic information." "There is no set curiculum". This caused a great deal of anxiety especially during the examination period when students felt they needed more preparation time. They were concerned that this would impact on poor performance in the examination.

5.7.4 Synthesis of follow-up study (1994)

Students found the transition to the novel programme to be very stressful but found it to be more stimulating than the traditional curriculum. There was a common perception that students exposed to the PBC stood to benefit academically and professionally. Students felt that the new curriculum encouraged

them to learn beyond what was expected of them and helped them to think critically, reason clinically and interact with group members more effectively. This made attending tutorials an enjoyable experience.

Among the grievances of students were the methods of assessment which students felt harboured an element of bias and prejudice. Although they were perceived to be good facilitators, tutors were criticised for favouring their own subjects. Biochemistry was singled out as being particularly difficult to learn under the present system. While students welcomed the opportunity to engage in independent, self-directed learning, they also opted for the structure and organization that lectures provided.

The merit of the PBC was described as very good to worse than the traditional curriculum but most students still thought that it can be viable if certain aspects were to be improved. The novel curriculum was perceived by some to be relevant especially since it is community-orientated and relates the basic sciences to the clinical cases. Others felt that the relevance of the curriculum would only surface later in their training.

The PBC was described as being very time consuming and taxing on students, leaving little opportunity for consolidation between tutorials. The result was that students were forgetting what information they were covering. They also had problems prioritizing their learning issues, that is, they would focus on a certain learning issue only to find it was not so important.

Also, since the clinical aspects were being emphasised so much, their knowledge of the basic sciences were perceived to be inferior to those following the traditional curriculum. Another criticism was that the PBC lacks structure: "There is no set

curriculum". It is not surprising, therefore, that this group opted for fewer learning issues for each case.

More importantly, though, respondents did not feel that the PBC should be abandoned but that running it in conjunction with the traditional curriculum might be a good idea.

5.8 Comparison of the 1993 and 1994 results

Students in the 1993 study found Biochemistry and Physiology difficult to study through the novel curriculum whereas Anatomy was not seen in the samelight. The 1994 group perceived only Biochemistry to be more difficult to study under the present system. This finding could be attributed to the fact that the additional discussion classes and lectures given in Physiology in 1994, were of some benefit.

The study done in 1993 showed that students considered being in charge of their own learning, in a favourable light (Question 20). The 1994 study revealed that students did not share this sentiment. This could probably be attributed to the personalities and cognitive abilities of the students. The 1993 group were perceived by faculty to be more motivated and more capable of independent study than the 1994 students.

On the other hand, the 1993 respondents agreed that learning on their own is very frustrating (Question 17), while the 1994 group disagreed on this point. A possible reason for this could be that the 1993 group, being very motivated, were trying to cover everything on a particular topic instead of concentrating on basic important issues. The 1993 group were satisfied with the examination methods used in the new curriculum while the 1994 group were not (Question 11).

Both the 1993 and 1994 studies showed that students' perception towards attending tutorials was positive (Question 21) and that small group tutorials had encouraged greater interaction among students and lecturers (Question 24). Studies done in 1993 and 1994 showed that students perceived learning in groups to be an effective way to learn (Question 22). The 1993 respondents agreed that learning from their peers is more effective than learning from their lecturers while the 1994 group disagreed on this point (Question 23).

The PBC was considered more effective in preparing them to be better doctors and was intellectually more stimulating than the traditional curriculum (Question 6). At the same time, the novel programme was seen by both groups as being very stressful (Question 1), since the volume of work was overwhelming and the time inadequate to complete learning issues.

The 1993 group perceived the clinical cases as being difficult to analyse while the 1994 respondents did not share this perception (Question 27). This could be as a result of the 1994 group having access to the case studies prior to the tutorials since the same case studies used in 1993 were also used in 1994. This would give them time to research relevant data beforehand. The 1993 group approached the clinical problems "cold", that is, they had not seen the cases before.

The investigation undertaken in 1993 and 1994 revealed that students' perception of the curriculum ranged from very good to very bad. The viability of the innovation was considered to be possible if its implementation were to be made more efficient.

That the novel curriculum is relevant, was undisputed by most students in both groups. In each study, there were some students who felt that information they were covering now, did not have immediate relevance but would be more apt in the "clinical" years of their training.

The advantages of the PBC cited by both target groups were numerous. For example, students stated that they were being given a sense of responsibility for their own learning and encouraged to think critically and clinically. The PBC was also praised for being instrumental in merging clinical material with basic science knowledge.

The analysis of the list of constraints of the novel curriculum showed that general grievances among students were that the PBC is time consuming and they did not know to what depth they should study. Too much information had to be mastered leading to a feeling of despair and helplessness. In spite of this, both groups felt that the PBC has made them want to learn more than is expected of them.

Both groups claimed that tutors favoured their subject fields and neglected the other subjects. Tutors, however, were considered to be good facilitators by both groups. Respondents in the 1994 study were particularly dissatisfied about the way examinations were conducted, claiming that they were subjective and unfair because different examiners were being used to examine different students. The 1993 group did not feel this way about examinations and no complaints were listed except that the examination time-table was too cramped.

5.9 Synthesis of empirical study

In this research, the perceptions of students towards the PBC as compared to the traditional curriculum, was investigated. The target group comprised the second year medical students at Unitra in 1993 and 1994.

The 1993 findings indicate that respondents are comfortable with the present curriculum and perceive it to be challenging, interesting, relevant and applicable to them as medical students. Of the 32 respondents, only 3 (9%) were totally against the system.

The study conducted in 1994 showed that four out of 44 students (9%) were totally against the new programme and one student (2%) felt it would be a better idea to introduce this curriculum in the fourth or fifth year of study.

That the cases were considered to be very clinical and difficult to analyse and that there were too many learning issus, would suggest that these aspects of the curriculum be revised. Other constraints encompass tutor distribution, time, depth of knowledge required and the stress factor. Additionally, planning and implementation of the curriculum has to be more effective and efficient especially with respect to the assessment of students as indicated by the second year students class of 1994.

Nevertheless, students have acknowledged that the problems experienced with the PBC now, are not insurmountable and that once they have been ironed out, this curriculum is favourable, relevant and viable.

In the following chapter, a summary and conclusion is given of this research. This will encompass a discussion of the aims and results of the study and futuristic prospects of the PBC in medical education.

CHAPTER 6

SUMMARY AND CONCLUSION

In this study, a literature review was given of the concept curriculum in general as well as the traditional and problem-based curriculum. The didactic situation at Unitra was discussed to put into perspective the empirical study that was to be conducted there. This scientific investigation which was concerned with the perceptions of students towards the PBC as compared to the traditional curriculum was conducted with the aim of curriculum evaluation in mind.

In this chapter a summary of the literature review and results of the empirical study is outlined. A condensed version of the evaluation report by an external consultant is also included.

6.1 The curriculum in general

It was considered necessary to give a definition of and explain the concept curriculum since this study is concerned with curriculum development and related issues.

6.1.1 The concept curriculum

The curriculum serves as a blueprint that provides guidelines, criteria, instructions and the starting point for a well-planned course for the didactic situation. These curriculum goals will be translated by the lecturer into instructional programmes according to the availability of resources.

From the definition of the curriculum, it can be seen to consist of teaching aims and training outputs, learning and teaching contents as well as evaluation procedures of the didactic activities.

6.1.2 Components of the curriculum

The components of the curriculum that must be considered during planning and development are:

* situation analysis
* aims
* learning content
* teaching-learning activities
* evaluation

The first factor to be considered will be the situation analysis which primarily entails a study of the target group. On the basis of the results of the situation analysis, the learning content and methods for imparting this information will be selected and organized.

In order to ascertain whether this content was understood by the learners and if the aims of the curriculum were achieved, an evaluation of student performance will have to be undertaken. Evaluation methods will have a bearing on the content taught and on the aims and objectives of the curriuclum. Thus, all the components are interrelated.

6.1.3 Curriculum development

This becomes essential when the effectiveness of an existing curriculum is evaluated and revised. Curriculum development is

never static but an ongoing process that entails consideration of all the components of the curriculum for greater effectiveness of its implementation. The factors influencing curriculum development are the target group, academic staff, the knowledge explosion, social demands and the logistic potential of the institution. In this study, the main factor that was looked at was the target group in the sense that their perceptions towards the novel curriculum was analysed.

6.2 General perspectives on the traditional curriculum

The role of the lecturer in this type of curriculum is to select the appropriate aims and objectives of the course and then to select and organize instructional material. Since the lecturer is usually concerned about preparing his students for the examinations, he has to follow a set syllabus with predetermined objectives and teaching/learning content. There is little opportunity for individual interpretation.

To this end, the lecturer is regarded as the controller of classroom activities since he organizes a teaching strategy in accordance with the demands of the curriculum. The predominant method of imparting content is through the leature whereby the leaturer presents material in a one-way communication process.

Therefore, the traditional curriculum is teacher-centred and subject-based. Students have no say in the generation of the aims and objectives of the curriculum, nor are they given the opportunity to decide to what depth they should study. What is required of them is to take down and memorize notes for reproduction in the examination.

6.3 General perspectives on the problem-based curriculum in general

In this section, the general principles and procedures of the novel curriculum are discussed.

6.3.1 Objectives of the course and organizing of content

The objectives in the PBC are broadly stated by the curriculum planners, serving as guidelines for students to generate their own detailed objectives. In this respect, the content is not predetermined, learning is individualized and not uniform. Students set their own learning tasks; knowledge and information is acquired as needed. Another feature of the PBC is that all subjects are integrated and studied as a whole.

In this author's opinion, these broadly stated objectives could be problematic in the sense that students may not know exactly what is expected of them and may want to master an abundance of information. Tutors in the PBC should guard against too many learning objectives being generated during tutorials, beyond the capacity of students being able to cope.

It is also reported in the literature that an excessive work-load has a deleterious effect on all students. When lecturers overloaded students with work, they could cause them to adopt a surface approach to learning. Entwistle & Tail in, Chambers (1992:143) have noted a relationship between "feeling overloaded and using memory without understanding", and between poor performance and "attributing difficulty in exams to an overdemanding course".

6.3.2 Instructional events

Small group tutorials are conducted to achieve the objectives of the curriculum. This open, democratic atmosphere is conducive to problem-solving and sets the basis for self-directed learning to occur.

6.3.3 Self-directed learning

Educational environments require the following characteristics for effective self-directed learning to occur:

* emphasis on the process of learning and on course content,
* responsibility for learning to be progressively handed over to the students,
* exploration of key concepts and principles instead of detailed knowledge on every topic, and
* integrated, active-learning, accompanying students' prior knowledge. Problem-based learning has demonstrated the capacity to achieve these characteristics.

Educators can aim to create conditions for their students in which good learning is possible. This can be achieved by indicating or exhibiting what is to be learnt. In this writer's interpretation, clear objectives with respect to PBL should be set and the students should be aware of this. This will constitute the minimun level of competence required by every student. Thereafter, students can set their own learning objectives which provides the starting point for self-directed learning.

6.3.4 Time

In order to learn well, students must have sufficient time to

devote to their studies. In this author's opinion, if they do not have the time to assimilate and accommodate information into their cognitive structures, students cannot be expected to be able to transfer or apply this knowledge to new situations. This would defeat the objective of PBL which relies heavily on the ability of the student to apply knowledge.

Deep learning has many implications for teaching and implies that the scope of a curriculum, especially in the early stages of the student's career, may need to be restricted. This will afford them more time and provide the opportunity and incentive to think, go back over data and work towards a broader frame.

6.3.5 Evaluation

Examination tools used in PBL should evaluate the student's ability to solve problems and apply information. The main thrust of evaluation methods focuses on the process of learning and the search for reasoning and information rather than simply measuring factual knowledge.

Formal and informal evaluation occur in the PBC. In informal evaluation, the student is the main evaluator of his progress and performance. Formal evaluation is undertaken at the end of a course and provides feedback on students' performance.

If examinations promoting recall of information, are used excessively to assess students in a problem-based curriculum, they learn towards the examination without accepting the philosophy of the curriculum. If an innovation is to be successful, students should be placed in test situations similiar to the experiences they are exposed to during their learning.

6.4 A comparison between the problem-based curriculum and the traditional curriculum in general

The general features of the conventional and novel curricula are discussed and related to one another.

6.4.1 Structuring of information

In the traditional curriculum, the content is predetermined and this structured information is then imparted to the students. In the PBC, the content is not as structured and uniform. Students learn according to their needs. Therefore, students following the conventional curriculum are passive receivers of information and in most cases, students are extrinsically motivated.

The traditional curriculum is separated into different subjects each containing its own information. In the PBC the disciplines are integrated into a whole course and presented as such.

6.4.2 Student-centred versus teacher-centred learning

The PBC is student-centred while the traditional curriculum is teacher-centred. In the former curriculum, the focus is on the learner. Students in the innovative programme become independent and responsible for their own education. They are encouraged to generate their own learning goals depending on what knowledge they are lacking. In being allowed to take charge of their education as regards direction, depth and speed, they are treated as self-determining adults. The PBC lends itself to self-directed study and is more student-centred, in the sense that students determine what they need to learn under the guidance of the tutor.

6.4.3 Small group tutorials versus the traditional lecture

It can be easily assumed that the traditional curriculum manifests itself predominantly in teacher - based learning where the teacher decides in advance what the student should know and then imparts this information mainly in the form of lectures. Lectures are usually implemented in a large hall with large groups of students.

Small group tutorials are generally used in PBL simply because this method of teaching and learning emphasises interpersonal and group skills. Students learn to work in a team and to compare their own performance with that of their peers.

6.4.4 Role of the tutor/lecturer

The lecturer in the traditional curriculum is regarded as the sole bearer of knowledge and sifts out information to impart to the student. It is the lecturer who decides what the aims and objectives of a lesson would be and what content should be covered. Teacher-student interaction is rare in a lecture situation where the teacher teaches a large group of students.

Tutors in the PBC are not the sole bearers of knowledge and their task is to facilitate the learning process rather than to teach facts. They interact more closely with students to help them think critically, reason systematically and to assist them in determining their limitations in knowledge.

6.5 The problem-based curriculum in medical education

Problem-based learning is highly suited to medical education. It avoids overteaching of subject matter and alleviates the

shortcomings of incongruence between the basic and clinical subjects. It recognizes that gaining knowledge is different from the use of knowledge. It allows for active participation of students in the learning transaction while stimulating the integration of knowledge.

Mostly, PBL teaches students the skill of solving problems, both familiar and novel. Students are faced with clinical problems early in their training to inculcate clinical reasoning skills and to introduce self-directed learning.

Problem-based, student-centred learning is a well established method of proven effectiveness in the teaching of clinical reasoning. A specific clinical problem becomes the stimulus for identification of what is necessary in order to understand and manage that problem.

6.5.1 Initial resistance to change

In the seventies, when PBL was first implemented, Wolff (1979:395), wrote that

> "some medical teachers ignore claims that PBL merits their attention, expecting that like other short-lived wonders and transcient fads this educational development will wither and disappear".

This gives an indication of the scepticism that was prevalent at the time towards PBL. Teachers who has investigated what the method was about, were dismissive and considered PBL to be of "dubious educational value".

Moreover, most educators, it was thought, would prefer conventional teaching of the basic sciences so that the student

can acquire a valid factual knowledge before embarking on active, self-directed learning. The main weakness of this argument is that PBL is intended to inculcate intellectual habits necessary for active, life-long learning.

In the struggle for accredition, newer schools are reluctant to risk innovation because their performance in the national examination could be adversely affected. Older schools are also reluctant since the accredition they have earned could be compromised.

6.6 The traditional curriculum in medical education

As regards the traditional curriculum, the lecturer is the authority figure in the didactic situation. He has complete control over what content is to be learnt and how it should be learnt. Lectures comprise the main method of instruction with practicals and demonstrations also being held to make certain theoretical concepts more meaningful.

Learning is organized around a subject area, for example, Anatomy, Microbiology or Chemical Pathology. The basic science concepts in each discipline are covered in isolation first and it is assumed that the student will later be able to apply this information to a clinical problem. Therefore, in the pre-clinical years, it is mainly the basic sciences that are studied.

The limitations of the traditional curriculum are being realised and the boundaries in traditional medical education are being broadened-pulled from outside by societal demands for more responsive institutions and pushed from within by those who are struggling towards responsive change. The ways in which this is being done is by:

* Changing of institutional missions.
* Revision of outdated curricular.
* Development of new methods of teaching and learning.
* Development of population-based medical education, and
* Application of ethics in medicine.

6.7 A comparison between the PBC and traditional curriculum in medical education

To put the aims of this study into context, the fundamental differences between the two curricula concerned were discussed.

6.7.1 Relevance of knowledge

In the pre-clinical years, when basic science information is not linked to clinical issues, students often become frustrated and question the relevance and applicability of what they are supposed to learn. The advantage of the PBC is that student learning starts with and centres around a clinical problem, that is, learning is put into a clinical context. Students are in a position to appreciate the relevance of basic science material to their future professional tasks. This also serves to motivate students who would exhibit an increased drive to study more than is expected of them.

Learning in the traditional curriculum does not occur in a clinical context. Information that is memorized in the pre-clinical years for examination purposes is unlikely to be recalled easily for application to a clinical problem, encountered in later years. When students are forced to master information that is relevant to a medical student, they can easily become demotivated.

6.7.2 Problem-solving

In the PBC, students learn problem-solving and clinical reasoning skills. They go through the process of developing hypotheses, gathering information, applying deductive reasoning to the problem and finally coming up with a solution. Thus, they are faced with the very situation they would be confronted with in their professional lives. The traditional curriculum on the other hand does not provide students with the opportunity to inculcate such skills.

6.8 The traditional curriculum at the University of Transkei

Students who went through the traditional curriculum were mostly taught by non-medical staff. In the pre-clinical years, it was mainly basic science information that was covered and this was not even related to medical issues.

The emphasis in the didactic situation was on completing the syllabus rather than on self-study or clinical reasoning skills. The arrangement and sequencing of content was similar to that of a textbook. The various subjects were taught and examined separately and staff members from the different departments seldom knew what the others were teaching.

6.9 The problem-based curriculum at the University of Transkei

The new curriculum involves student-centred, self-directed learning with small group tutorials being the main form of teaching and learning. The curriculum is also integrated, that is, all the subjects are treated as and studied as a whole. A clinical problem forms the basis for study and the innovation is,

therefore, problem-based. This method draws on the previous experience of the adult learner.

The examinations consist of the content examination, Individualized Process Assessment, Objectively Structured Clinical Examination or Objectively Structured Practical Examination and the ongoing evaluation during tutorials.

6.10 A comparison between the traditional and problem-based curriculum at the University of Transkei

A comparison between the two curricula is given from the students' perspective and an external consultant's point of view. General, observations made by faculty and students are also outlined.

6.10.1 General observations regarding the two curricula

At the onset of the novel curriculum, it was understandable that faculty and students alike would make some comparison between the old and the new programmes. The general observation by faculty was that the PBC is very costly and time-comsuming. Difficulty was experienced when formulating clinical problems for each case. Also, there was a sense of lack of direction initially experienced by tutors and students alike.

Lecturers in the conventional track were not trained to be facilitators of group tutorials and had to be given training in this respect when the new curriculum was introduced. Additional staff members were also recruited. Furthermore, resources had to be upgraded. For example, new rooms for tutorial sessions were made available and a media centre was established.

The traditional lecture was not conducive to good interpersonal relationships between students and/or lecturers. On the otherhand, the PBC created a feeling of companionship among tutors and students.

These comparisons were unscientific, though, and it was considered important for the evaluation of the novel curriculum, to undertake a scientific investigation into the perceptions of students regarding the two curricula. A summary of the results of such a study is given below. Also included is an evaluation by the external examiner who visited Unitra for this purpose.

6.10.2 Assessment by external evaluator

According to the external examiner (Camp, 1994:2), who was invited to evaluate Unitra's programme, the assessment system at Unitra is consistent with and supportive of the PBL philosophy and also reflects the goals of the programme. In this author's estimation, the Individualized Process Assessment conducted at Unitra is subjective and can be made objective by following Knox's suggestion that all examiners use the same sets of Modified Essay Questions which can be developed further to form the basis of an oral examination. In this way, it would be possible to apply a more structured oral assessment to any group of candidates.

According to Camp (1994:2), the problem-based component of the curriculum is "up and running" and looks very much like new PBL programmes that she has observed at other medical schools. The number and proportion of faculty at Unitra who are knowledgeable of and committed to the PBL approach, is remarkable.

It is recommended that increased attention be paid to tutor training, both of new and experienced tutors. This was in view of the fact that the second year tutors had better tutoring skils than the third year tutors. Consideration should be given to offering different levels of faculty development/support, that is, beginner sessions versus advanced sessions.

According to Camp (1994:2), the system developed for student assessment adhered to the philosophy of the programme and reflected the objectives of the curriculum.

The areas pointed out as needing additional strengthening included ancillary personnel. The number of support personnel (secretaries, coordinators) is seriously lacking in this programme.

> "I have never seen a medical school functioning with as few support staff as this one does. This is the single most important area requiring upgrading".

As the programme expands it will be nearly impossible for faculty to keep up the present roles of creator of programmes, teacher, secretary and housekeeper as they are presently doing (Camp, 1994:3).

Other comments were that faculty should ensure that students have adequate unscheduled time to engage in independent study called for by the generation of learning issues. Faculty should also guard against "chipping away" of this uninterrupted time needed for effective self-study (Camp, 1994:3).

Attention should be paid to upgrading the physical facilities and other resources. The acoustics in the tutorial rooms is very

bad, as is the space for writing on the boards. The availability of computers and other media such as compact disc players, videotape players and so forth would have to be upgraded in order to support the programme and to train students for life-long learning.

In summary, it was stated that:

> "The Unitra Faculty of Medicine is to be commended for their implementation of the medical education programme which utilizes both problem-based learning and community-based activities. The basics of the PBL programme are in place and functioning at a satisfactory level. With increased experience and time, and particularly with the addition of some additional resources, this programme canbe an outstanding example of a medical education curriculum designed to both maximize student learning and to serve the country's interests. The outlook for this programme is very positive, especially with the current group of committed, dedicated faculty. It should consider itself the model for the future of South African medical education".

6.10.3 Students' perceptions of the newly implemented problem-based curriculum

Students in 1993 and 1994 agreed that the change to the PBC was very stressful and the volume of information they had to handle was overwhelming. Another common grievance was that the depth of knowledge required is vague. Students felt that there were too many learning issues to be tackled in the given time and that

they were simply presenting material at the tutorials for the sake of doing so. Thereafter, this knowledge was easily forgotten, implying that a surface approach to learning was being adopted and that knowledge was not being properly assimilated and accomodated.

Also, tutors of different specialities should be more evenly distributed in the tutorial groups since tutors had the tendency to favour their subject areas. The 1994 group were very dissatisfied about the examination methods claiming that they were bias and subjective.

Nevertheless, respondents acknowledged that the new programme is intellectually more stimulating than the traditional curriculum and that the former prepares them better for learning to solve medical problems. The PBC has encouraged greater interaction among students themselves and among students and staff. Furthermore, it inculcates a sense of independence in students and encourages them to become intrinsically motivated.

Although there was a general perception that the PBC should be run together with the traditional curriculum, students did not feel that the PBC should be abandoned. In fact, respondents were of the opinion that once the problems , experienced during the inception of the new programme, were solved, the PBC has great potential to be more relevant and viable. Therefore, students have noted the many advantages associated with the new system and have viewed it in a favourable light.

6.11 Synthesis

Therefore, this study involved a look at the traditional curriculum followed in the past, and compared that to the PBC presently in operation with a view to initiating changes for more effective implementation of the innovation in the future.

It is evident that when a new curriculum is introduced there are bound to be problems and some resistance to change from students and tutors alike. In this study it was found that students were generally satisfied with the transition to the innovative programme as it proved to be of greater relevance to them as doctors in training.

For the first time they understood why it was necessary to learn something as opposed to simply memorizing it for regurgitation in the examinations. The fact that the basic sciences are related to clinical knowledge in the PBC served to enhance their motivation because students could see the applicability of newly mastered information, to future tasks.

It is imperative that evaluation of the curriculum remain an ongoing process and that studies similar to this be undertaken to ensure that the programme remains a success.

Furthermore, students in the novel programme are treated as responsible, self-determining adults, in charge of their own learning. This motivates students to learn much more than is expected of them and therefore prepares them for life-long, self-directed learning.

There were also problems, however, that were encountered by students, who for the first time had to take on the enormous task of searching for information which, in the traditional lecture, was merely given to them. Evidently, students were overwhelmed by the volume of information they had to cover and complained that time was a major constraint in the new system of learning.

They were also unsure as to what level they should proceed in mastering information, sometimes placing too much emphasis on certain learning issues while neglecting the others. All the

time there was the constant pressure of imminent examinations for which they felt they were not thoroughly prepared.

Therefore, the studies undertaken in 1993 and 1994 showed that there are problems being encountered by the students with the new curriculum but these problems can be ironed out for more effective implementation of the novel programme. Generally, students are happy with the changes in their training and feel that they are bound to benefit from them.

The findings of this study came as a relief for faculty as it is important that students accept the innovation, considering they are the ones most directly involved. Also, a scientific, objective study such as this was encouraged as the results can be taken as conclusive and the necessary curriculum changes can be effected.

6.12 Recommendations

No curriculum is static but constantly in a state of flux. What is good for one group of students might differ for another. It is imperative, therefore, that evaluation of the curriculum remain an ongoing process and that studies similar to this be undertaken to ensure that the programme remains a success.

Recommendations for future implementation of the PBC would be that students be given a short course at the beginning of the year, on certain basic principles in the subjects they will be studying in that year. This will not only alleviate the frustration of looking for that information themselves but will also help in the transition to the novel approach to learning when students are expected to be more self-reliant.

Furthermore, tutors should be given frequent training as facilitators of learning and as examiners in the new curriculum. The examination methods also need to be reviewed and an element of greater objectiveness should be aspired towards to ensure that students are treated fairly. That is to say, there should be conformity in the assessment of each student.

By solving these teething problems, faculty can ensure that the advantages of the PBC are more observable and that its future role in medical education will be unsurpassed.

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ANNEXURE : STUDENT QUESTIONNAIRE

The following questionnaire was used in the final and follow-up study to determine student's perception of the problem-based curriculum as compared to the traditional curriculum.

Age:
Sex:
Qualifications:
Date:

Instructions:

Each of the statements below states a perception towards the problem-based curriculum and the traditional curriculum. Please indicate the extent of agreement between the perception expressed in each statement and your own personal perception, by circling one of the letter choices next to each statement.

SA: strongly agree
A: agree
D: disagree
SD: strongly disagree

1. I have found the change to the problem-based curriculum to be extremely stressful. SA A D SD

2. I feel that I have gained less knowledge with the problem-based curriculum than if I had been exposed to the traditional curriculum. SA A D SD

3. The problem-based curriculum has destroyed my self-confidence. SA A D SD

4. The problem-based curriculum only benefits brighter students. SA A D SD

5. A medical student who is exposed to the problem-based curriculum is bound to be a more competent doctor. SA A D SD

6. I find problem-based learning to be intellectually more stimulating than the traditional curriculum. SA A D SD

7. With the problem-based curriculum, I think I am lost in a jungle of information and I can't get out. SA A D SD

8. Problem-based learning prepares me better for learning to solve medical problems than the traditional curriculum. SA A D SD

9. The problem-based curriculum has made me want to learn more than is expected of me. SA A D SD

10. The problem-based curriculum has encouraged greater interaction among students. SA A D SD

11. I am satisfied with the examination methods used in the problem-based curriculum. SA A D SD

12. The problem-based curriculum should be run together with the traditional curriculum. SA A D SD

13. The problem-based curriculum should be abandoned in favour of the traditional curriculum. SA A D SD

14. Learning Biochemistry through the present curriculum is more difficult. SA A D SD

15. Learning Anatomy through the present curriculum is more difficult. SA A D SD

16. Learning Physiology through the present curriculum is more difficult. SA A D SD

17. Learning on my own is very frustrating. SA A D SD

18. I am willing to spend time looking up information for myself. SA A D SD

19. I would prefer it if we were simply given lectures on all the learning issues. SA A D SD

20. To be in charge of my own learning, is a terrific experience for me. SA A D SD

21. I look forward to attending tutorials. SA A D SD

22. Learning in groups is an effective way to gain knowledge. SA A D SD

23. Learning from my peers is generally more effective than learning from my lecturers. SA A D SD

24. I am able to interact well on an interpersonal level with members in my group. SA A D SD

25. Tutors are good facilitators of group discussions. SA A D SD

26. The cases are too clinically orientated. SA A D SD

27. The clinical cases are difficult to analyse. SA A D SD

28. There should be fewer learning issues for each case. SA A D SD

29. The problem-based curriculum has helped me relate what I have learnt in the basic sciences to the clinical cases. SA A D SD

30. The problem-based curriculum has helped me work out clinical problems and derive hypotheses. SA A D SD

31. BRIEFLY EXPRESS YOUR OPINION ON THE

1) MERIT:
2) ADVANTAGES:
3) DISADVANTAGES:
4) VIABILITY:
AND 5) RELEVANCE:

OF THE PROBLEM-BASED CURRICULUM AS COMPARED TO THE TRADITIONAL CURRICULUM.

Dear Sir/Madame,

I am doing a study on "Student's perceptions of the problem-based curriculum as compared to the traditional curriculum" as part of my studies towards a Diploma in Tertiary Education.

I would appreciate it if you would complete the accompanying questionaire and return it to me at your earliest possible convenience. All responses will be treated with the strictest confidence.

Thank you for your co-operation.

Yours sincerely,

S. Hassan.