THE DEVELOPMENT AND EVALUATION OF THE OBJECTIVE STRUCTURED DISPENSING EXAMINATION (OSDE) FOR USE IN AN UNDERGRADUATE PHARMACY TRAINING PROGRAMME

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A thesis submitted in partial fulfillment of the requirements for the degree of Magister Pharmaceuticae in the Department of Pharmacology, School of Pharmacy, University of the Western Cape.

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KEY WORDS

Objective Structured Clinical Examination (OSCE)

Objective Structured Dispensing Examination (OSDE)

Assessment Tools

Undergraduate Pharmacy Course

Rational Pharmacotherapy Course

Service Learning

Pharmaceutical Services

Professional Competency

DECLARATION

I declare that *The Development and Evaluation of the Objective Structured Dispensing Examination (OSDE) for use in a Pharmacy Undergraduate Pharmacy training Programme* is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Denise Eleanor Frieslaar November 2004

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DEDICATION

I dedicate this work to my two daughters Claire and Kelly who kept me focused and supported me throughout the thesis.

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CHAPTER 1

INTRODUCTION

In recent years there has been a major paradigm shift in the training of pharmacy students at undergraduate level. No longer does the curriculum focus mainly on the content knowledge of the students, but also increasingly on the competence of the student to apply their knowledge in real practice situations and actually perform some of the tasks eventually expected of a pharmacist. One such task in which the pharmacist must be competent is the dispensing of medicines to the patient.

Dispensing is a complex task involving reading and evaluation of prescriptions, the preparation and issuing of medicine and advising the patient on the safe and efficient use of their medicine. It is a task for which the pharmacist must apply the knowledge gained from their experience in practice as well as knowledge gained from all the disciplines covered in the undergraduate pharmacy programme. Pharmacy students in training should, on the other hand, be exposed to this task as early as possible so that they can develop the skill and integrate the content knowledge being learnt and become competent in dispensing even before they graduate.

With the shift in emphasis in the pharmacy curriculum has come the problems of how to provide the appropriate learning opportunities for the student, how to assess their competence in the practical skills such as dispensing and which

assessment tool(s) could be used for this purpose. Such assessment tool(s) must not only be useful to assess knowledge, but also the attitude of the student towards the patient, as well as the skill of the student to dispense accurately. The tool(s) should ideally also be effective in both formative assessments to promote the students learning, and in summative assessments, to decide if the student is competent at the end.

One such tool that may meet these criteria is the OSCE (Objective Structured Clinical Examination). While OSCE's have quite wide acceptance as a summative and formative assessment tool, especially in the medical field (Townsend, A.H. et al 2001), it has not been widely used in pharmacy training as a tool for the assessment of students. For this study it was thus proposed that, using the OSCE format as a guide, it should be possible to develop a similar tool i.e. the OSDE (Objective Structured Dispensing Examination) for use to assess competence in dispensing. However, even if this was possible several research questions still remained. Would such an OSDE be useful as both a formative and summative assessment tool? Can it be used in real practice situations? Can it be used to increase specific aspects of the pharmacological knowledge of the students? And, can it be used by minimally trained pharmacists at practice sites to evaluate students training under their supervision?

Consequently, the primary objectives of this study were to (i) design an OSDE that could be used to evaluate students being trained in a service-learning course

and (ii) ascertain whether such an OSDE could be used to facilitate the learning of the students.

It was hypothesized that students whose progress was assessed through regular exposure to a specially designed OSDE (i.e. one in which higher marks are given to pharmacological aspects) and/or a OSDE with feedback afterwards during the early parts of the time spent at the site (formative assessment) would (a) show increasing competence (as measured by OSDE, video and reports/assessments/feedback from facilitators) over the course of the program, and (b) gain higher marks in final assessments (summative assessment) .

CHAPTER 2

BACKGROUND

2.1 Introduction

In this chapter, the changes that have taken place in the pharmacy profession over the past decade, the impact it has had on pharmacy education in South Africa and the complex nature of the skill of dispensing and how to assess it will be discussed.

2.2 Pharmacy Education in South Africa

Pharmacy is a field where drugs are prepared and dispensed by a pharmacist and in South Africa the latter is registered under Act 53 of 1974 by the South African Pharmacy Council (P.S.S.A. Pharmacy Law Compendium. 2003). The field of pharmacy covers various domains, ranging from the professional and training, to the economic and the health care delivery domains (Meyer Stout, P. 1995). Within each of these domains the role of the pharmacy professional is undergoing dramatic change, from one that is primarily medication dispensing-based to one that entails expanded responsibility for providing comprehensive "pharmaceutical care" to patients within the health care delivery system (Summers, R. et al 2001).

This shift in emphasis towards the patient, along with the fact that pharmacy education and training has perhaps also not adequately kept up with these changes, has resulted that the average pharmacy student entering the work place, in recent times, frequently appears to be under-prepared. Similarly, in the United Kingdom it has been found that there was a significant gulf between the employers' expectations of the level of clinical competence of the newly qualified pharmacist and their actual ability, and that there was the need for a robust clinical framework for the development of pharmacy staff through their undergraduate and pre-registration training (Fleming, G.S. et al 2003).

In response to this apparent lack of clinical competency, the South African Pharmacy Council requested and started the comprehensive review of the pharmacy curriculum. In addition, in 1995, South Africa, as a country, also embarked on instituting quality assurance programs applicable to all levels of education. The South African Pharmacy Council responded by implementing a program focusing on outcomes competencies for entry- level pharmacists. The tasks performed by a pharmacist were analyzed, examined in detail and grouped, and after an extensive consultation process with all the role players and stake holders, seven Unit Standards, each of them having a specific outcome, resulted. The seven unit standards, summarized in table 2.1, govern the training of students wishing to become pharmacists and the manner in which they are taught at a tertiary level.

On the international front, the International Pharmaceutical Federation's (IPF) Academic Section, in order to help address the change in the role of the pharmacist, drafted guidelines for Good Pharmaceutical Education Practice (IPF draft 3.1998).

According to the IPF, the professional aim of pharmacy was to develop the so-called "seven– star pharmacist" and the latter must be a caregiver, manager, teacher, decision-maker, communicator, leader and, above all, a life-long learner. Both the SA Pharmacy Council and IPF guidelines now have to be incorporated into the undergraduate pharmacy training programmes.

Table 2.1 The Unit Standards governing the education and training of pharmacy students issued by the Interim Pharmacy Council of South Africa. (Ref: Unit Standards for Future Pharmacists at Entry level.1998; Pretoria: SAPC).

Unit Standard No.	Basic Unit Standard
EL1	Organise and control the manufacturing, compounding and packaging of pharmaceutical products.
EL2	Organise the procurement, storage and distribution of pharmaceutical materials and products.
EL 3	Dispense and ensure the optimal use of medicine prescribed to the patient.
EL4	Provide pharmacist initiated care to the patient and ensure the optimal use of medicine.
EL5	Provide education and information on health care and medicine.
EL6	Promote community health and provide related information and advise.
EL7	Participate in research and ensure the optimal use of medicine.

2.3 Pharmacy Education and Training at the University of the Western Cape (U.W.C.)

As one of the 9 tertiary institutions providing pharmacy training in South Africa the School of Pharmacy at the University of the Western Cape (U.W.C), also has to fulfill the training guidelines of the SA Pharmacy Council. As part of its program to meet the Unit Standards for entry level pharmacists requirements recommended by the SA Pharmacy Council, the School of Pharmacy at UWC in 2001 introduced a problem- based learning (PBL) module that was entitled: Skills Development for the Implementation of Rational Pharmacotherapy. This course developed from the Applied Pharmacology 422 course (UWC Calendar, 2003) that was given to 4th year B.Pharm students and consisted of a clinical block (comprising hospital visits, ward rounds, clinical case study reviews) and an on-campus PBL pharmacotherapy course (comprising the review of principles of rational pharmacotherapy, the (P)ersonal -drug concept and dispensing to mock patients –see Appendix III). The latter module also has site visits where the students practise what they are taught on campus and this module is described further below.

2.3.1 The Pharmacotherapy Module at U.W.C.

2.3.2 Historical Development of the Course

Essentially, the pharmacotherapy module developed as a separate project initiated after the pharmacology staff (Prof J Syce) attended a problem-based

learning course on rational pharmacotherapy given jointly by Groningen University of the Netherlands, the WHO (World Health Organization) and the Department of Pharmacology of the University of Cape Town (UCT) in 1996 (First African Course on Pharmacotherapy Teaching, 1996). The latter course was basically aimed at teaching medical students how to prescribe rationally. The Department of Pharmacology at UWC took up the challenge of adapting that course for its 4th year pharmacy students and has since developed it (as a departmental project) through several phases into the present day " Skills Development for the Implementation of Rational Pharmacotherapy" module, one of the 2 modules in the Pharmacology 422 Course.

In the first phase of development (1998 to 2001), the module was presented as an on-campus PBL course focusing on the principles of PBL; principles of rational pharmacotherapy (De Vries, T. et al 1995), the P-drug concept and using mock patients (see Appendix III). In 2002, funding was secured via the Community Higher Education Service Partnership (CHESP) project (CHESP Info Package – compiled by the CHESP office –UWC 2000) and the second phase commenced.

The primary aim of the CHESP project is to engage higher education institutions in the development of partnerships with communities and services (public, private, non-governmental organizations (NGO's), community-based organizations (CBO's), etc. with the goal of addressing the national reconstruction and development agenda through the development of teaching,

research and training (Jacoby, B.1993). Essentially this translates into the development of courses with input from these three sectors. These courses are credit bearing, involve a practical component where students spend a certain amount of time in the community setting and address a community development priority (Zlatkowski, E.1998). The philosophy behind this is called *service learning* (CHESP Info Package –compiled by the CHESP office –UWC 2000).

2.3.3 Service Learning and the Pharmacotherapy Module

Service learning means a method under which students or participants learn and develop through active participation in thoughtfully organized service that: (a) is conducted in and meets the needs of a community and is coordinated with an elementary school, secondary school, institution of higher education, and / or community service program and with the community; (b) helps foster civic responsibility; (c) is integrated into and enhances the academic curriculum of the students or the educational components of the community service program in which the participants are enrolled (Howard,J.1993); and (d) includes structured time for the students and participants to reflect on the service experience (National and Community Service Trust Act of 1993).

There are 3 approaches to service learning. The first approach stresses the use of community activities to provide experience of service rendering for the students i.e. *service* learning. The goal here is for students to provide service to communities and learn general lessons about society. The second approach stresses use of community activities to provide specific learning experiences for

students – i.e. service *learning.* Now the goal is for students to recognize and apply academic concepts experientially in a course with clear learning objectives (McHugh Engstrom, C.et al 1997). The third approach, *service and learning*, addresses the issue of control and has the goal of bringing communities and (academic) institutions together as equal partners and build upon the assets and strengths and capacities of each (Foss, G. et al 2003).

It seemed feasible that the CHESP project could serve as a vehicle to introduce the afore-mentioned principles of service learning into the pharmacotherapy module and, indeed, the second (and presently active) phase of development of the " Skills development for the Implementation of Rational Pharmacotherapy" module now focuses on transferring the previously on- campus programme (phase 1) into a service learning one, presently with stress on service *learning*. The primary aim with the second phase of development of the module was to transfer more of the training programme to the practice sites, these being the pharmacies at local primary health care centers. This second phase of development also includes the evaluation of the academic suitability, viability, integrity and merits of the module to train pharmacy students. In subsequent phases of development of the pharmacotherapy module the focus will be on the *service* aspects, community needs and multidisciplinary interaction through this programme at the primary health care sites.

For convenience sake the present pharmacotherapy module can be divided into 2 parts, and the aims of the overall module and details of the two parts are given below.

2.3.4 The Aims for the PBL Pharmacotherapy Module

The aims for the module as presented in 2003 covered three areas *viz*. the student, pharmacist at the CHC and the patient.

With respect to the student, the overall aims of the module were to develop (1) skill in problem based learning (PBL), (2) understanding of the theoretical principles of, and practical skills in, rational drug therapy, (3) understanding of the P (ersonal)-Drug and P-treatment concept (selection of drugs), (4) experience in dispensing medicine, with focus on the application of pharmacology in the practice of pharmacy in community and hospital settings, (5) competence in the assessment of prescriptions, (6) experience in counseling and educating patients on medicine use, (7) familiarity with patient needs, primary health care issues and procedures in the day hospital system with special emphasis on issues related to the pharmaceutical services, (8) experience in the provision of pharmaceutical services at community day hospitals and, last but not least, (9) skills for life-long learning.

The aims of the module with respect to the pharmacist on site were to develop (1) skill in the PBL techniques and skill as facilitators for the training of

students, (2) understanding of the theoretical principles of, and the practical skills in, rational drug therapy, (3) experience in the training of students in dispensing i.e. mainly in the assessment of prescriptions and counseling patients on medicine use and (4) skill to assess students in training.

Finally, the aim with respect to the patients at the site was to improve the level of education of the patients on the use of their medication so that this, in turn, would improve patient compliance and decrease medication wastage. The patient would also learn to take responsibility for their health. During the present study achieving the aims for the module were mainly focused on the aims for the student; the other aims were to be focused on in the next phase of development of this service- learning module.

2.3.5 The Parts of the PBL Pharmacotherapy Course

During the implementation of this study the course was divided into two parts: Problem Based Learning (PBL) sessions and the Pharmacy Practice Site visits. The PBL sessions took place on campus where the students were trained in PBL techniques, rational pharmacotherapy, P-drug concept, treatment guidelines and OSDE (Objective Structured Dispensing Examinations) techniques.

The pharmacy practice site visit program entailed 3-hr visits to pharmacy practice sites over a suitable period (e.g. 8 to 10 weeks).

This visit schedule was, in turn, divided into 3 sections**.** During the first two weeks – the orientation phase- the students were orientated to the facility and staff, exposed to the drugs encountered at the site and introduced to the standard operating procedures (SOP) of the pharmacy at the site that they are attending. During the second phase - the practice phase- the students were expected, over five to seven weeks, to apply the principles of rational pharmacotherapy which they had learnt on campus in their dispensing at the site. They were assessed while doing these activities. The last phase- the evaluation phase, took place in the last week (#10) of the practice site visit schedule and focused on the assessment of the dispensing ability of the student.

The main activity of the students at the practice sites centered on the activity of dispensing. Through this activity they were to learn, develop skill or competency and provide service. But what is dispensing?

2.4 Dispensing

Dispensing involves the issuing and labeling of medicine according to a doctor's prescription. The act of dispensing is a complex one. As indicated by Cooper and Gunn 1979, it requires the extensive knowledge of the stability of medicine and their ingredients; the principles of compounding; dosage; chemical, physical and therapeutic incompatibilities; packaging methods; labeling procedures and, finally, the legal requirements affecting the storage, supply, records, containers

and labeling of substances affected by the Medicine and Related Substances Act 101 of 1965, Amendment Act, No.59 of 2002, (PSSA Pharmacy Law Compendium, 2003). In addition to this list of requirements, the “dispenser” also has to give advice and information to patients on how to use medicines safely and effectively to maximize therapeutic outcomes as well as provide information to promote the health of the public (Good Pharmacy Practice Manual. 1997). Thus, to evaluate a student competent in dispensing presents a challenge, as dispensing is a complex activity.

The major objective in the Skills for the Development for the Implementation of Rational Pharmacotherapy module was to develop students’ knowledge in applying the principles of rational pharmacotherapy through the development of competence in dispensing. However, the problem was, how to assess such competency?

Competency assessment is always outcome orientated; the goal is to evaluate performance for the effective application of knowledge and skill in the practice setting (Benner, P.1982 & Redman, R.W. 1999). Competency is always three - dimensional and integrates knowledge, attitude, and skill (Zlatic, T.D.2000), and this complicates its assessment. In professions such as pharmacy, which depend on a changing knowledge base and draws on both experience and an international pool of knowledge to solve complex problems, there is the realization that there are limitations to the competency approach (Pennington, D.G.1994).

2.5 Evaluation of Dispensing in the Pharmacotherapy Course

2.5.1 General Aspects of Assessment or Evaluations

Assessment in education is commonly used to certify the amount that individual students have learnt and to provide an accountability measure for students and educational systems as a whole (Hunt, E. et al 2002). However, in the workplace, information would be collected about an employee, in this case, the student, and based on the evidence about performance or competence, a judgment will be made i.e. a person is judged to be competent or not competent (Sinclair Bell, J. et al 2001). Assessments can serve a number of purposes namely; it can be diagnostic, formative or summative and can be continuous and/or integrative.

Diagnostic assessment is used to judge a student's strengths or weaknesses so as to decide whether a student needs help to continue in a programme and what action needs to be taken to help the student.

Formative assessments are used to provide feedback to students about progress that they had made in the work covered. This assessment is carried out to motivate and help students with their learning.

Formative assessments provide a profile of what a student has learnt. It also provides the teacher with qualitative and quantitative data for modification of his teaching (Mc Guire, C. 1973). There are however, a number of problems associated with formative assessments. Firstly, it requires that the assessor know in advance both the course material that students are being taught and the problems that they may encounter in understanding the course material.

However, in order to obtain this information, the assessor either has to have a great deal of experience in assessing students or be aware of the research literature on students' beliefs and disbeliefs. Secondly, they are labour intensive. i.e. each student has to be assessed individually and at his or her own level of knowledge (Hunt, E. et al.2002).

Summative assessments are used to provide judgment on students' achievements in order to establish the students' levels of achievement at the end of a course, grade or rank or certify students to proceed or exit from the education system, select students for further learning, predict future performance in further study and underwrite a license to practice (Makoni, S. 2000).

Continuous assessments are assessments that take place at more than one point in the learning process, while an i**ntegrative assessment** is one that simultaneously assesses a number of outcomes using a combination of assessment methods and instruments together. It ensures that learners are able to integrate the different bits of information, skill and attitudes they have developed across a course, so that they may be judged competent or incompetent.

Thus from the types of assessments above it can be seen that assessments or evaluations in education is a systematic process which enables the teacher to "measure" to what extent the student has attained the educational objective.

Evaluation always includes measurements (quantitative or qualitative) plus a valued judgment.

To make measurements, measuring instruments must be available which satisfy certain requirements so that the results mean something to the teacher, the leaner and the society, which, has set up the educational structure.

2.5.2 Qualities of a Measuring Instrument

In education measuring instruments are generally referred to as tests or examinations. The four main qualities of any measuring instrument (examination) are: validity, reliability, objectivity and practicability.

The first quality, i.e. validity is the extent to which the test used really measures what it is intended to measure. Validity is a concept, which relates to the results obtained with a test and not the test itself. It relates more specifically to the interpretation of the results obtained by means of the results (Harold, G.et al 2004). The second quality, i.e. reliability, can be defined as the degree of confidence that can be placed in the results of the examination. It is the consistency with which a test gives the results expected e.g. consistency of the results according to the examiners or assessors. Indeed, research has shown that there can be differences in the marking of different assessors and in the marking of a single assessor (Brown, et al. 1997). The third quality, objectivity, is the extent to which independent and competent examiners agree on what constitutes a “good” answer for each of the items of a measuring instrument.

The last quality, the practicability of an assessment, refers to ensuring that assessments take into account the available financial resources, facilities and equipment and time. This was in fact one of the reasons why the pharmacotherapy course under study was taken into the community health centers because observation, which is quite expensive in facility time could be made by non-faculty members such as post-graduate students and pharmacist facilitators (Harold, G.et al 2004) at the site. Placing the student in a real work situation in the pharmacy also made observation of the students' competency in dispensing more authentic and meant that expensive workstations which an OSCE required did not have to be created (see later).

2.5.3 Methods used to Evaluate Performance or Training

Assessment methods refer to the activities that an assessor engages in as he/she assesses a learner's work. Normally these activities are:

- Observation: Observing the learner while he/she is carrying out tasks, real and simulated, as defined in an outcome or outcome statement.
- Evaluation of a document/product: Evaluating something the learner has produced after the task has been completed.
- Questioning: Asking questions orally or in writing, which is answered orally, or in writing. The questions could relate to the observation or to the product. This is done to check the learner's understanding of why certain activities were carried out or to test the learner's ability to work within contexts required in the range statements or in other contingencies suggested by the assessment criteria.

Questioning is also an important means of establishing the learner's underpinning knowledge and understanding (Els, L. et al 2003).

Several different assessment methods and instruments were however used in the Pharmacotherapy course and these, as well as the marks allocated to the various items, are shown in table 2.2. Dispensing which was one of the activities of the Pharmacotherapy course involves completing a number of tasks, in which the candidate is to be assessed competent. Thus the most suitable method of assessment should involve observation, and one assessment tool that could be used to evaluate this activity might be one similar to an OSCE. So what is an OSCE?

2.6. Objective Structured Clinical Examinations (OSCE)

The OSCE is an examination where a student or learner is required to solve a clinical problem (Harden, R.M.et al 1975). The methods of assessment in an OSCE can be oral, clinical observation and the use of "standardized patients". An OSCE uses multiple workstations for each of which the student is given a specific time limit to pass through it (Smee, S.2003). At the stations basic clinical skills, problem solving and counseling skills are evaluated. The station may involve a trained examiner using a standardized checklist (Kramer, A. et al 2003) or standardized patients that are also trained examiners (Shaw, L. 2004). Standardized patients are lay people trained to present patient problems realistically and, if required, to report on how they have been treated i.e. can express an opinion on the competency of the student (Wass, V. et al 2001).

Table 2.2 Methods of assessment used in the Pharmacotherapy course

Activities of the Assessor				
Instrument	**Observation**	**Product evaluation**	**Questioning Written/ oral**	**Marks allocated**
Portfolios on PBL		√	√	10 %
Projects	√	√	√	10%
Weekly activity reports		√	√	10%
Progress assessment by Facilitator	√			10%
*** Progress Test Written MCQ format**			√	
OSCE/OSDE	√	√	√	30%
Questionnaire i.e. CHESP			√	
PBLsessions on campus. **P formularies** **Participation in sessions.** **OSCE/OSDE**	√ √ √	√	√	30 %

***Specifically introduced for the study. Eventually contributed 10% of the module mark and was used in place of the progress assessment by facilitator.**

The use of these standardized patients are valuable when communication skills are being tested.

In general, the OSCE has been shown to be a valid and reliable assessment instrument for testing the acquisition of clinical skills (O'Connor, H.M. McGraw, R.C. 1997). In fact, as an assessment tool, OSCEs' have many strengths and weaknesses. Some of the strengths include the following**.** An OSCE focuses on the ability of the candidate to synthesize and apply knowledge in clinical settings, as well as their ability to interact effectively with patients. It also tests motor, interpretive and clinical integration (Siegel, B.S.2004).

Through the observation of the student performances, an OSCE can point out flaws in the curriculum and in this way lead to changes in teaching. With an OSCE one can to attempt to overcome the low reliability and validity of direct observation evaluation and it is an effort to make the evaluation "more authentic", i.e. examines those behaviors that are important (Shaw, L. 2004).

The weaknesses of the OSCE are mainly associated with the large time commitment that is needed to develop and implement it and the subjectivity and inter- rater variability that are problems with this assessment format. Overall, the reliability of the OSCE appears, to some extent, to be limited, although the levels of validity and stability are generally quite high (Woodburn, J. et al 1996).

Because the OSCE was both a valid and reliable assessment instrument to test clinical competency and has been recognized as not only a useful evaluative tool, but also as a valuable method for enhancing student learning (Kowlowitz,V. et al. 1991), it was thought that perhaps this format could be used to meet the needs of pharmacy students being trained in dispensing. In the process, a new evaluation tool, the OSDE (Objective Structured Dispensing Examination) was designed. The primary goal with the OSDE would be to use it to assess the dispensing skill of the pharmacy students while they were being trained in the work place. Two issues then became important *viz*. the design of such an OSDE and how it might be used in a course set to train pharmacy students in the skill of dispensing.

2.7 Design of the Objective Structured Dispensing Examination (OSDE)

Since the OSDE was to be used to evaluate the students' performances in the activities pertaining to dispensing, the latter first had to be analyzed and divided into discrete activities. It was found that the activities or skills associated with dispensing could be divided into three main domains *viz*. communication, intellectual skills (with the focus on pharmacological knowledge) and practical skills (see Appendix VIII) and these had to be covered in the various sections of the OSDE (see Fig. 2.1 below). In addition, it was expected that the students' would rely heavily on the PBL techniques that they were taught earlier in the course (first term – see course outline Appendix III).

These PBL techniques are based on methods designed to promote skills in critical analysis, self-directed learning (SDL), and problem solving (Barrows, H.S. 1990), all of which also needed to score in the OSDE.

Based on the above it was consequently believed that an OSDE sheet divided into the following four sections and based on the afore-mentioned domains could be designed.

- Section A Analysis of folder; measures the critical thinking, and problem solving and practical skills of the student
- Section B Establishing contact with the patient or caregiver; measures the students' communication skills.
- Section C Dispensing: giving information, instruction and warnings, measures the student's counseling skills i.e. communication, as well as the practical skill of dispensing the drugs to the patient and the providing of information in an integrated manner.
- Section D Communication style: measures the skill with which the student delivered the information.

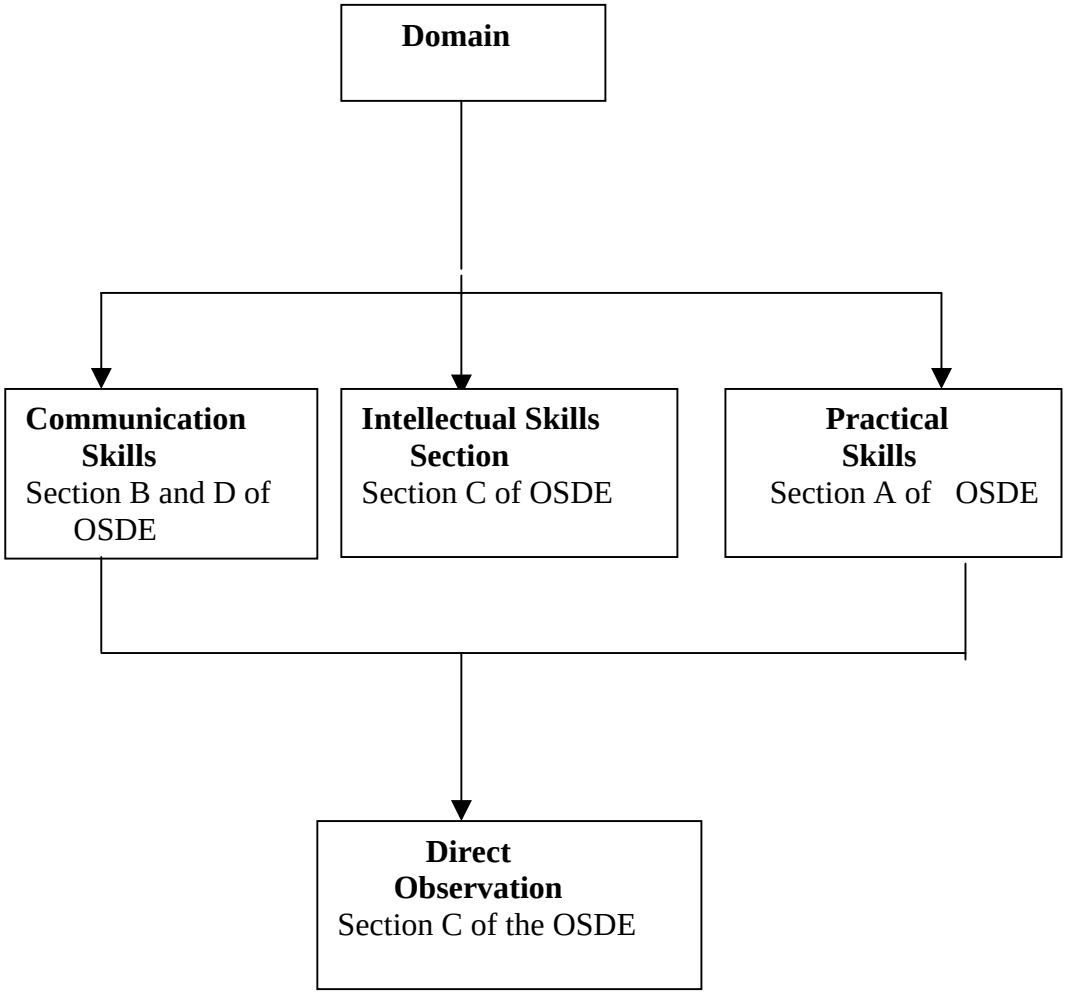


Figure 2.1 Domains to be evaluated in the skill of dispensing and proposed matching with sections of the OSDE (adapted from diagram in Appendix VIII)

For each section the total number of marks to be allocated could be decided according to the importance of the skill that it measures. Since the "Skills development for Rational Pharmacotherapy" module was primarily one covering the discipline of pharmacology, it could further be reasoned that

section C that dealt with the provision of pharmacological information could be allocated the greatest amount of marks (Boonstra, E.2003). Although, communication (section D) is an important skill, it was not the focus of this investigation and hence could be allocated fewer marks.

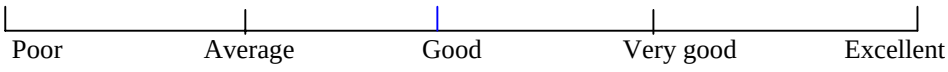
Thus it seemed quite feasible, using the above arguments and ideas, that an OSDE could be designed that might be suitable to evaluate the skills focused on the pharmacotherapy course. In addition, the factors that could influence the assessment of the performances using such an assessment instrument also had to be borne in mind.

2.8 Factors Influencing Rating of an Evaluation

An evaluation made by a human observer is more or less objective and subject to error. The following are the factors as given by (Guilford, J.P. 1954) that influence the rating of an evaluation.

a) Errors due to leniency

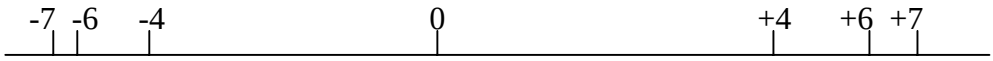
Leniency is a well know factor that influences ratings. It refers to the tendency to be tolerant to mistakes made and thus not being very objective. One means of counterbalancing this tendency is to use a scale containing only one “unfavorable” appraisal in five, for instance as indicated by “poor” in the following scale:



In this case the appraisals will probably be distributed around “good”

b) Central tendency

Central tendency is a factor which refers a tendency of examiners not to give extreme appraisals and to group all candidates around the mean. This *central tendency* may be reduced by using a scale that is wider at the center than at the ends, for example:



c) The halo effect

Sometimes, one particular feature of a candidate sometime seems so important to the examiner that it influences the overall evaluation. Thorndike called this the *halo effect (*Thorndike, E.L 1920). However, the presence of this effect is reduced as the number of separate aspects of the problem dealt with by the evaluation is increased.

d) The logical error

The *logical error* is similar to the halo effect and occurs when the examiner supposes that there is a relationship between two variables to be evaluated and that “if the first variable is of a particular order, the second will be similar”. This error may be reduced if the evaluation relates to an observable element rather than to an abstraction, which could lead to semantic confusion.

e) The contrast error

An observer who is very orderly will tend to consider, *by contrast*, that other people are less orderly than he is, and *vice versa*. On the other hand, people frequently believe that "others are like me" and are very surprised to see that this is not so.

f) The proximity error

This is the situation where, if an observer evaluates two different factors, the evaluation of one factor tends to influence that of the other, and the shorter the interval between the two, the more pronounced the tendency (proximity error) would be. It was likely that some or all these factors might play a role when evaluation of the OSDE itself was assessed as an assessment tool to assess students' performances.

2.9 Motivation for use of the OSDE in the Pharmacotherapy Module

The OSCE has been found to be a good tool for the summative assessment of clinical skill and even better as a formative assessment evaluation tool (Prislin, M.D.et al 1998). In formative assessments, the OSCE was found to be particularly useful to identify skills learning deficiencies so that these problems could be corrected (Townsend, A. H. et al 2001). It was thus anticipated that the same should hold true with the OSDE if it was to be used as an evaluation tool to assess the development of skill in dispensing.

Broadly speaking, the following attributes might be desired in such an assessment tool that was to be used for the course i.e. it should be reliable, valid, easy to use by the facilitators and assist the students to learn.

It was thus anticipated that an OSDE designed using the afore-mentioned design considerations might be a particularly useful tool to objectively assess student competency in dispensing, could be used by pharmacists facilitators with minimal training; could be used in the practice setting and could be used to guide students in their learning of the skill of dispensing. Specifically, it was hypothesized that students whose progress is assessed through regular exposure to a specially designed OSDE (i.e. one in which higher marks are given to pharmacological aspects) and/or OSDE with feedback afterwards during the early parts of the time spent at the site (formative assessment) will (a) show increasing competence (as measured by OSDE scores, video and reports/assessments/feedback from facilitators) over the course of the program, and (b) gain higher marks in final assessments (summative assessment).

CHAPTER 3

WORKPLAN

The objectives of this study were to design and evaluate an OSDE (Objective Structured Dispensing Examination) that could be used to evaluate students being trained in a service-learning course and (ii) to ascertain whether such an OSDE could be used to facilitate pharmacy students' learning of dispensing and pharmacology.

It was hypothesized that students whose progress was assessed through regular exposure to a specially designed OSDE (i.e. one in which higher marks are given to pharmacological aspects) and/or OSDE with feedback afterwards during the early parts of the time spent at the site (i.e. during formative assessment) would (a) show increasing competence (as measured by OSDE scores, video and reports/assessments/feedback from facilitators) over the course of the program, and (b) gain higher marks in final assessments (summative assessment).

To realize the above objectives the following needed to be done.

A) Design of a special OSDE

It was hypothesized that the typical OSCE format and procedure could be easily modified to obtain the OSDE. The main feature of the design of the special

OSDE was that it should contain specific sections focusing on and measuring skill or competence in dispensing as well as specific knowledge of pharmacology. In addition, the marks allocated to these sections could be changed over the study period with the intention that in this manner the students could be directed to the important aspects to learn (sections to focus on). The effectiveness of this special OSDE was to be compared with that of the generic OSDE, i.e. one in which no change in marks occurred and the generic OSDE with accompanying feedback from the assessors.

B) **Implementation of the OSDE at a service-learning site**.

To test the effectiveness of the OSDE it was decided to implement it as part of the service- learning, Pharmacotherapy, CHESP-sponsored course, being offered at UWC. During 2003 the following issues were pertinent aspects with respect to the implementation of the OSDE. Firstly, as service-learning sites primary health care pharmacies were chosen because they offered the opportunities for service learning, training of students in dispensing and the involvement of in-service pharmacist facilitators. These centers all had to be similar and function in a similar manner, in terms of patient and disease profiles, number of patients and the type of personnel servicing the site and their standard operating procedures, so as to remove the influence that the site may have in the final analysis. Secondly, to remove the effect that different student abilities might have, the participating students needed to be grouped in such a way that they were of equal academic ability and were equally distributed between the service-learning sites.

For the 3 tools to be investigated i.e. the generic OSDE, the generic OSDE plus feedback and the special OSDE, the students had to be divided into 3 groups (designated A, B and C). Thirdly, a sufficiently long period of training of the students at the site during which they would be exposed to the assessment tool (i.e. the OSDE) was needed. An 8-week period of exposure to the OSDE seemed appropriate to allow enough time for the tool to have an impact. Fourthly, since an objective of the study was to investigate how well the OSDE would perform as an assessment tool under real work (i.e. *service*-learning) conditions, the pharmacist facilitators were to be given minimal training on how to assess the students.

C) Evaluation of the OSDE as an assessment tool.

First, the special OSDE had to be evaluated as a summative assessment tool and it was decided that this could be done by comparing the results the students obtained in the final OSDE with that which they obtained in a multiple-choice question (MCQ) test (in this study called the progress test). The latter test was to be implemented to provide another tool to monitor the progress of the students over the 8-week period at the sites as well as a tool against which the OSDE could be measured as a summative assessment tool. Secondly, the OSDE was to be evaluated as a formative assessment tool by comparing the trends in the results obtained by the 3 study groups of students over consecutive OSDE tests, with a special focus on their performance on section of the OSDE that is associated with pharmacological knowledge (to be referred to as Section C of the OSDE).

Thirdly, the reliability of the scoring of Section C of the OSDE by the on-site assessors was to be assessed by comparing their allocated scores with that given by an independent assessor. Finally, it was believed that an indication of the students' and pharmacists' understanding of the OSDE process could be obtained through the analysis of the questionnaires that were required to be completed by all participants (students, academic staff, community and services providers) in the CHESP courses. For this study the post implementation CHESP questionnaire could be modified and used to check whether the students and pharmacist facilitators, in the end, understood the OSDE sheet and the assessment process.

CHAPTER 4

RESEARCH METHODS

4.1. Introduction

In this chapter, the grouping and placement of the students at the sites, the design and implementation of the OSDE and the methods for analysis of the OSDE data are discussed. In addition, the methods used in the implementation of the video assessments, questionnaires and progress tests, as well as the overall analysis of the data obtained, are discussed.

4.2 Site and Placement of Students

4.2.1 Placement of Students

The 40 students attending the 2003 Pharmacotherapy course at the School of Pharmacy, University of the Western Cape, formed the study group in this investigation. Each of these students had completed the on campus problem-based Pharmacotherapy course, which was done in the first semester of 2004. They were then divided into 3 groups A, B and C, based on their of academic performance in previous pharmacology examinations. All the students were first ranked based on their results obtained in the pharmacology examinations taken at the end of the second semester of their third year, and first semester of the 4th year, of study.

From this list, students were allocated to the 3 groups in descending order of academic performance e.g. the student ranked #1 (i.e. with highest academic score) to group A, # 2 to group B, # 3 to group C, # 4 to group A, etc until all 40 students were allocated. The students in each group were then told to further sub-divide themselves into groups of two or three each taking the study C.H.C (Community Health Centres) sites and travel preferences into consideration. This resulted in 12 groups of three and 2 groups of two students and an overall total of 14 sub-groups. Each subgroup of students were only to visit one C.H.C site throughout the programme, but they were so allocated that all the 4 sites were visited by at least some of the students in each of group A. B and C. That is, the students from each group (A to C) were equally allocated to each of the sites. See figure 4.1.

4.2.2 Site and Visits

The 4 sites used in this study were Delft Community Health Centre (CHC), Bishop Lavis C.H.C, Dr Abdurahman C.H.C. and Vanguard C.H.C. They were all located in the Western Cape, within easy reach of the University and all of them had similar patient loads and diseases i.e.hypertension, diabetese, epilepsy and asthma. Each subgroup of students was then scheduled to visit their one site for 10 visits. This occurred in the second semester of 2003. The visits took place on one morning a week on either Tuesday, Wednesday or Thursday and the 10 visits were group into 3 phases; viz. visits 1 & 2 = the orientation phase; visits 3 to 9 = the practice/implementation phase and visit 10 = final evaluation phase, ideally with gaps between each of the phases.

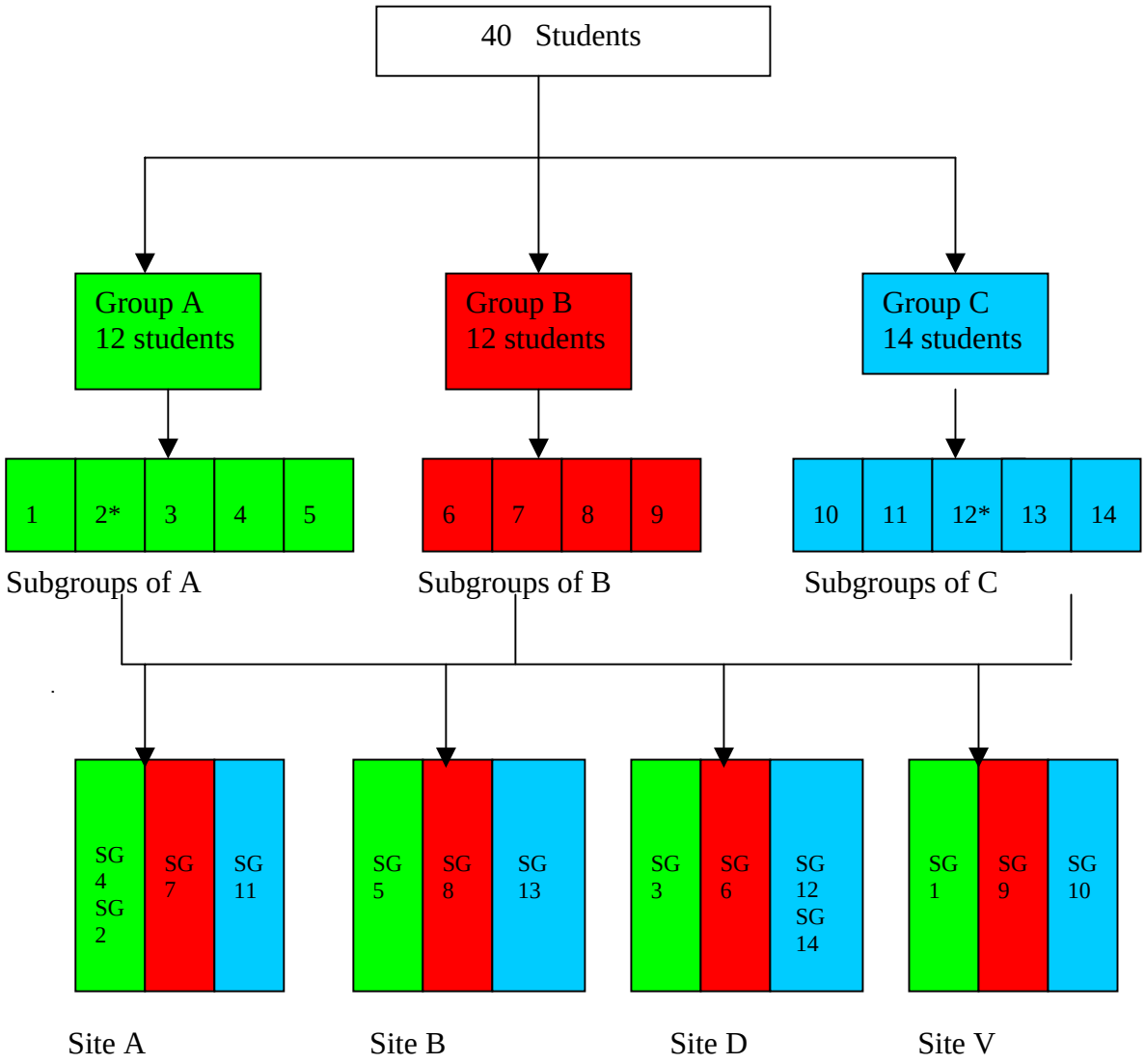


Figure 4.1. Distribution of the groups at the sites. Forty students were divided into three groups A, B and C and 14 subgroups, designated SG1, SG2, etc. and consisting of 2 or 3 students each and which were allocated to Site K= Dr Abdurahman C.H.C. Site B =Bishop Lavis C.H.C, Site D= Delft and Site V = Vanguard C.H.C.
*** Subgroups with 2 students.**

During the orientation phase the students were introduced to the site, its personnel, its services and operating functions. The practice phase ,was a period of time where the students learnt and practice dispensing (i.e. implementation of

pharmacotherapy) while being regularly assessed using the OSDE. At visit 10 (i.e. the evaluation phase) the final OSDE assessment was conducted (see Appendix VI). A copy of the full schedule of visits is shown in Appendix V.

4.3 Design and Implementation of the OSDE

4.3.1 Design of the OSDE

Three types of OSDE's sheets were used in this investigation, viz. (a) Generic OSDE, (b) Feedback OSDE and (c) Special OSDE. Students in group A were allocated to do the generic OSDE, those in group B the feedback OSDE and those in group C the special OSDE.

All of these OSDEs had the same design and comprised four sections, covering (A) folder analysis and preparation for dispensing, (B) establishing contact with patient/caregiver, (C) dispensing: giving information, instructions, warnings and (D) communication style (see figure 4.2). The marks given to each section varied according to the importance of the section. For example; section A was given 10 marks of which 5 marks were allocated to correct labeling, section B was given 5 marks, section C which was regarded as an extremely important section was given 25 marks and each item was given 5 marks each, while section D was also given 10 marks with 4 of those marks being for the structure of the conversation.i.e whether logical, etc. The total amount of marks for the OSDE amounted to 50.

The generic OSDE and the feedback OSDE sheets were the same (figure 4.2), the only difference being that with the feedback OSDE the students were given feedback on their questions and concerns regarding the OSDE assessment. The academic staff, on campus after each OSDE test was done, provided this.

The special OSDE sheet was also similar in design, but differed in the weighting given to sections A and C. There were 2 special OSDE's. In the first one, designated SPP1 (figure 4.3) the weighting for item 5 in section A was increased from 5 to 10 marks and that for items 2 and 4 of section C were increased from 5 to 10 marks. In the second special OSDE SPP.2 (figure 4.4) the only section C was changed. The weighting for item 1 increased from 5 to 10 and that for item 4 of this section remained at 10 marks. This increase in marks of the various items in sections A and C was to indicate the importance of these items in these sections and to attract the students' attention to them.

4.3.2 Implementation of the OSDE Tests

After the two visits in the orientation phase the students were required to practice and do formal OSDEs during each of the subsequent visits. For the students in group C, the practice OSDEs were done during visits 4 to 6 using special OSDE SPP1 (figure 4.3) and during visit 8 using special OSDE SPP 2 (figure 4.4). During these stages the students in groups A and B were assessed using the generic OSDE (figure 4.2). There was no limit to the number of prescriptions that could be done and the time allowed for each during the practice OSDE sessions.

The formal OSDE tests were conducted at visits 3, 7, 9 and 10 according to the schedule given in table 4.1 below. For these assessments the generic OSDE (figure 4.2) was used for all the students and each student had to do a minimum of 3 prescriptions (with no time limit) except for the final OSDE test when 6 prescriptions had to be done in 30 or 42 minutes including preparation (i.e. labeling and checking), handing out and counseling of the recipient of the medicines.

Table 4.1: Schedule of dates for visits of students at the different Community Health Centres.

Site	Subgroup of students	Date of OSDE			
		Test 1	**Test 2**	**Test 3**	**Test 4**
Delft C.H.C.	**3**	23 July	2 September	7 October	21 October
	6	30 July	3 September	8 October	16 October
	12	29 July	27 August	2 October	15 October
	14	22 July	28 August	9 October	14 October
Vanguard C.H.C.	**1**	24 July	12 August	10 September	25 September
	9	23 July	13 August	9 September	25 September
	10	30July	7 August	3 September	11 September
Dr Abdurahman C.H.C	**4**	22 July	13 August	25 September	1 October
	7	30 July	9 September	8 October	15 October
	2	24 July	13 August	25 September	1 October
	11	23 July	27 August	7	14
Bishop Lavis C.H.C	**5**	23 July	13 August	11 September	23 September
	8	22 July	14 August	9 September	25 September
	13	24 July	7 August	4 September	10 September

During each OSDE the pharmacist facilitator and/or an academic or post-graduate student facilitator scored the performance of the student. These scorers indicated their marks by circling the appropriate number on the sheet after listening to, and watching the performance of, the students. The scorer also tallied the final total for each prescription and calculated the average for all the prescriptions done by the student per session. Except for the final OSDE (i.e. OSDE test 4), the marked OSDE sheets were copied and returned to the students.

4.4. Analysis of OSDE Marks

Both the test and practice OSDE sheets were collected by the postgraduates at the end of each visit to the site, the results collated and weekly entered into a Windows Excel™ database. The marks were checked for errors and the averaged percentage recalculated before entry into the database. After the final visit the average (mean) and standard error of the mean (SEM) attained by each group for each OSDE test were calculated and imported into Graph Pad Prism ™ to facilitate visual display and statistical analysis of trends.

4.5. Video Assessments

As an independent monitor of the OSDE assessments and the students' progress videotape recordings of the students' performances were also made during the formal test OSDEs. For this purpose a video camera was provided for each site. An independent assessor *viz*, an academic staff member in Discipline of

Pharmacy Practice, UWC, afterwards assessed the video recordings of the final OSDE tests. She independently assessed the students' performances from the video, focusing on items in section C and according to a set of criteria as outlined in Appendix VII. The marks for the assessments based on the videos were also averaged for each OSDE test and compared with the average marks allocated by the assessors on the OSDE scores sheets.

CHESP PROJECT: RATIONAL PHARMACOTHERAPY
GENERIC OSDE SCORE SHEET

Student…… **Student no……**
Assessor:…… **Student Group…….**
Site :…… **Date……**

A. Preparation for Dispensing: Folder Analysis	**Folder #**	**Folder 2**	**Folder 3**
• Correct reading of the prescription	0 1 2	0 1 2	0 1 2
• Identify/define the medical problem	0 1	0 1	0 1
• Identification of errors/Complications/	0 1	0 1	0 1
• The objective/goal of the treatment	0 1	0 1	0 1
• Correct labeling (patients name;folder #;date;dosage forms&total units; warnings)	0 1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Penalty Incorrect dosage and Drug info	0 -1 -2	0 -1 -2	0 -1 -2
SUBTOTAL (max: 10)			

B Establish contact with patient/care giver			
• Greeting (establish language to use)	0 1	0 1	0 1
• Verify folder number	0 1	0 1	0 1
• Verify name of patient	0 1	0 1	0 1
• Verify who medicine is for	0 1	0 1	0 1
• Get attention of patient	0 1	0 1	0 1
Penalty for over elaboration (minus)	0 -1 -2	0 -1 –2	0 -1 -2
SUBTOTAL (max: 5)			

C. Dispensing: give information, instructions, warnings			
• Name of drug(s)	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
• Drug effects(s)	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
• Instructions for use	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
• Adverse effects/warnings/cautions	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
• Teaching of patient/Ensure that the patient understands the instructions	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
Penalty if special interaction not mentioned	0 –1 –2	0 –1 –2	0 –1 –2
SUBTOTAL (max: 25)			

D. Communication Style			
• Clear (audibility, pronunciation) and understandable.	0 1 2	0 1 2	0 1 2
• Structure of conversation (logical, not jumping around)	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
• Allowing patient to express him/herself and ask questions.	0 1 2	0 1 2	0 1 2
• Duration of dispensing time	0 1 2	0 1 2	0 1 2
SUBTOTAL (max: 10)			
TOTAL (max: 50)			

Figure 4.2 Example of the Generic OSDE sheet

CHESP PROJECT: RATIONAL PHARMACOTHERAPY

OSDE SCORE SHEET

Student…… **Student no……**

Assessor:……. **Student Group…….**

Site :……. **Date……**

		Folder #	Folder 2	Folder 3
A.	**Preparation for Dispensing: Folder Analysis**			
•	**Correct reading of the prescription**	**0 1 2**	**0 1 2**	**0 1 2**
•	**Identify/define of the medical problem**	**0 1**	**0 1**	**0 1**
•	**Identification of errors/Complications/**	**0 1**	**0 1**	**0 1**
•	**The objective/goal of the treatment**	**0 1**	**0 1**	**0 1**
•	**Correct labeling (patients name;folder #;date;dosage forms&total units; warnings)**	**0 2 4 6 8 10**	**0 2 4 6 8 10**	**0 2 4 6 8 10**
	Penalty Incorrect dosage and Drug info	**0 -1 -2**	**0 -1 -2**	**0 -1 -2**
	SUBTOTAL (max: 15)			
B .	**Establish contact with patient/care giver**			
•	**Greeting (establish language to use)**	**0 1**	**0 1**	**0 1**
•	**Verify folder number**	**0 1**	**0 1**	**0 1**
•	**Verify name of patient**	**0 1**	**0 1**	**0 1**
•	**Verify who medicine is for**	**0 1**	**0 1**	**0 1**
•	**Get attention of patient**	**0 1**	**0 1**	**0 1**
	Penalty for over elaboration (minus)	**0 -1 -2**	**0 -1 –2**	**0 -1 -2**
	SUBTOTAL (max: 5)			
C.	**Dispensing: give information, instructions, warnings**			
•	**Name of drug(s)**	**0 1 2 3 4 5**	**0 1 2 3 4 5**	**0 1 2 3 4 5**
•	**Drug effects(s)**	**0 2 4 6 8 10**	**0 2 4 6 8 10**	**0 2 4 6 8 10**
•	**Instructions for use**	**0 1 2 3 4 5**	**0 1 2 3 4 5**	**0 1 2 3 4 5**
•	**Adverse effects/warnings/cautions**	**0 2 4 6 8 10**	**0 2 4 6 8 10**	**0 2 4 6 8 10**
•	**Teaching of patient/Ensure that the patient understands the instructions**	**0 1 2 3 4 5**	**0 1 2 3 4 5**	**0 1 2 3 4 5**
	Penalty If special interaction not mentioned	**0 –1 –2**	**0 –1 –2**	**0 –1 –2**
	SUBTOTAL (max: 35)			
D.	**Communication Style**			
•	**Clear (audibility, pronunciation) and understandable.**	**0 1 2**	**0 1 2**	**0 1 2**
•	**Structure of conversation (logical, not jumping around)**	**0 1 2 3 4**	**0 1 2 3 4**	**0 1 2 3 4**
•	**Allowing patient to express him/herself and ask questions.**	**0 1 2**	**0 1 2**	**0 1 2**
•	**Duration of dispensing time**	**0 1 2**	**0 1 2**	**0 1 2**
	SUBTOTAL (max: 10)			
	TOTAL (max: 65)			

Figure 4.3 Example of the Special OSDE: SPP1

CHESP PROJECT: RATIONAL PHARMACOTHERAPY

OSDE SCORE SHEET

Student…… **Student no……**

Assessor:……. **Student Group…….**

Site :……. **Date……**

	Folder #	Folder 2	Folder 3
A. Preparation for Dispensing: Folder Analysis			
• Correct reading of the prescription	0 1 2	0 1 2	0 1 2
• Identify/define of the medical problem	0 1	0 1	0 1
• Identification of errors/Complications/	0 1	0 1	0 1
• The objective/goal of the treatment	0 1	0 1	0 1
• Correct labeling (patients name;folder #;date;dosage forms&total units; warnings)	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
Penalty Incorrect dosage and Drug info	0 -1 -2	0 -1 -2	0 -1 -2
SUBTOTAL (max:10)			
B . Establish contact with patient/care giver			
• Greeting (establish language to use)	0 1	0 1	0 1
• Verify folder number	0 1	0 1	0 1
• Verify name of patient	0 1	0 1	0 1
• Verify who medicine is for	0 1	0 1	0 1
• Get attention of patient	0 1	0 1	0 1
Penalty for over elaboration (minus)	0 -1 -2	0 -1 –2	0 -1 -2
SUBTOTAL (max:5)			
C. Dispensing: give information, instructions, warnings			
• Name of drug(s)	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8 10
• Drug effects(s)	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
• Instructions for use	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
• Adverse effects/warnings/cautions	0 2 4 6 8 10	0 2 4 6 8 10	0 2 4 6 8 10
• Teaching of patient/Ensure that the patient understands the instructions	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
Penalty If special interaction not mentioned	0 –1 –2	0 –1 –2	0 –1 –2
SUBTOTAL (max: 35)			
D. Communication Style			
• Clear (audibility, pronunciation) and understandable.	0 1 2	0 1 2	0 1 2
• Structure of conversation (logical, not jumping around)	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
• Allowing patient to express him/herself and ask questions.	0 1 2	0 1 2	0 1 2
• Duration of dispensing time	0 1 2	0 1 2	0 1 2
SUBTOTAL (max: 10)			
TOTAL (max: 60)			

Figure 4.4 Example of the Special OSDE: SPP2

4.6. Progress Tests

In order to have another tool with which the results obtained in the OSDE assessments could be compared, the students' performances were also assessed using 4 progress tests conducted during the investigation. For these tests both the pharmacist facilitator and the academic facilitator compiled questions dealing with drug substitution, dosage forms, dosage directions, drug strengths, adverse effects, etc and these were put into a computer-based question bank. From the latter, questions were then randomly selected to compile each of the 4 tests (see Appendix IV) for examples which were given to the students at the required times. For each progress test the marks for the individual and groups of students were compiled and put into the database and used to assess the progress of the student or groups of students.

4.7. Questionnaires

The questionnaires that were drawn up by the CHESP (Community Higher Education Students Partnership) project for the students and service provider were modified to embed a section focusing on the OSDE assessments. In the questionnaire for the students, the questions asked, dealt with the students' awareness of the OSDE sheet (i.e. did they notice any changes in the marks for the various sections of the OSDE) and the actual assessment process. The responses to these questions were entered into a database and analyzed. The service provider was asked similar questions in their questionnaire, but their questions dealt with how they assessed the students. See Appendix I and II for examples.

4.8 Statistical Analysis

Finally, to assess the suitability of the special OSDE as a tool for the formative and summative assessment of the students' competence and progress in dispensing skill, (1) the mean and standard error of the mean (SEM) of the scores obtained by each group (or subgroups) for each formal OSDE test were calculated and assessed for significant differences by (2) using the student t test, analysis of variance and correlation analysis (Graph pad Prism^{R}). The level for statistically significant differences were set at p=0.05.

CHAPTER 5

RESULTS AND DISCUSSION

5.1 Introduction

In this chapter the results obtained in this study will be discussed under the following headings: (1) aspects of implementation, and (2) evaluation of the OSDE as an assessment tool.

5.2 Aspects of Implementation

Several aspects pertaining to the implementation of this study first needed to be taken into perspective, viz. the sites where the study was conducted, the placement of students, the conduct of the OSDE's at the sites, the assessors involved in the evaluation of the students' OSDE performances, the recording of the OSDEs, the progress tests and feedback from select participants.

5.2.1 Aspects of Implementation pertaining to the Sites

The implementation of the study went well at all four sites, with the exception of Vanguard C.H.C. The students visited the sites as per schedule, attendances were good and OSDE's were generally done as per schedule at the times they were due. However, at Vanguard CHC there were problems with the implementation of the practice OSDE's and one of the test OSDEs.

This affected the assessment results for the students in subgroups #1, #9 and #10.

During this study the sites were comparable with respect to the number of pharmacists and facilitators supervising the students' training at the sites. The number of pharmacists at all the sites remained constant throughout the study, except in the case of Bishop Lavis C.H.C. At the latter site one of the two pharmacists died and was only replaced a few months later with a community pharmacist, who however had very little involvement in the study. During the time when there was only one pharmacist at this site, the academic facilitator and the post-graduate facilitator helped out with the assessment of the students.

The sites were also similar in terms of their patient numbers and diseases treated during the investigation period (see table 5.1). The number of patients attending the pharmacy (which is equivalent to the number of prescriptions filled) as well as the approximate number of items filled per month at the 4 sites is given in table 5.1. The diseases treated at the site were a combination of similar chronic and acute conditions, with the top 5 being, hypertension, diabetes, epilepsy, arthritis and asthma**.**

In the final analysis of the data, all the sites could therefore be considered as being equivalent except for Vanguard CHC where special consideration had to be given to the fact that all the OSDE's were not conducted as planned (see below).

Table: 5.1 The number of items dispensed and prescriptions filled at the Western Cape C.H.C sites.

Site name	Site Address	Monthly no. of items dispensed.	Monthly no. of prescriptions filled.
Delft C.H.C (Site D)	Main Rd, Voorbrug, Delft	32094	9042
Bishop Lavis C.H.C (Site B)	Lavis Drive, Bishop Lavis	18645	5929
Dr Abdurahman C.H.C (Site K)	Eland Street, Kewtown, Athlone	26328	6849.
Vanguard C.H.C (Site V)	Candlewood Rd, Bonteheuwel	43890	7942

5.2.2 Placement of Students

Initially, the total number of students participating in the study was 40. They were subdivided as shown in Table 5.2 with most of the subgroups comprising 3 students. Subgroup 4 and 14 however consisted of two students each. Two students dropped out of the pharmacotherapy course during the year, and the subgroups affected by this were subgroups 4 and 8. In addition, on occasions one or two students did not do one or other of the OSDEs. In fact, four students did not do the final OSDE. Thus, the total number of students who completed the study was 38, while the number of students doing the final OSDE was 34 (the final sample size used in the data analysis).

Table 5.2. Allocation of student groups at C.H.C sites. The student in groups A, B, and C, were subdivided into 14 subgroups which were equally dispersed over the sites, with Dr Abd CHC = 11, B.Lavis CHC = 9,Delft CHC =11 and Vanguard CHC = 9 students each. * Denotes groups where number of students was changed.

Group	Dr Abd CHC		B.Lavis CHC		Delft CHC		Vanguard CHC		Total
Group A	Subgrp #	Sample (n)	Subgrp #	Sample (n)	Subgrp #	Sample (n)	Subgrp #	Sample (n)	**14 (11)***
	2	3	5	3	3	3(1)*	1	3	
	4	2 (1)*							
Group B	7	3	8	3 (2)*	6	3	9	3 (1)*	**12 (9)***
Group C	11	3	13	3	12	3	10	3	**14**
					14	2			
Total At site	**11(10)***		**9(8)***		**11 (9)***		**9(7)***		**40 (34)***

5.2.2.1 Visit Schedule

All the students visited the sites according to the schedule set out for them (see Appendix V). These visits started on the 23 July 2003 and extended over a period of three months ending in mid October 2003. However, there were individual students who could not be assessed on the date set out for their groups, due to the students being involved with the clinical block (the other module of the pharmacology 421 course) which ran concurrently with the C.H.C. site visits. They were therefore accommodated on different dates, but this was the exception rather than the rule. Generally, all the student groups were therefore tested at the scheduled times (see Appendix VI), except for those at Delft C.H.C. where the schedule was not followed

for subgroups #6, and # 12 who completed only three of the four test OSDEs.This did not however, dictate any specific change in the way the data was to be analyzed.

5.2.3 The Implementation of the OSDE's at the Site

There were two types of OSDEs conducted at the sites. These were the practice and the test OSDEs'.

The **practice OSDE's** were conducted during visits 4, 5, 6 and 8. It was during these practice visits that the special OSDE was to be implemented and given to group C, while groups A and B were given the generic OSDE and the generic OSDE plus feedback, respectively. Unfortunately, the practice OSDE's were not implemented at all the sites as intended. At Vanguard C.H.C. the practice OSDE's did not take place. Several factors contributed to this. For instance, initially, it was difficult to fully integrate the student activities into the daily functioning and workflow of the site, and physical space (or layout) limitations hampered efforts to do the OSDEs. The layout of the pharmacy and some of the operating procedures were however later changed to accommodate the assessment procedure without interrupting the normal workflow at the site. Most of the test OSDEs could then also be done at this site. The omission of the practice OSDEs at Vanguard CHC however, needed to be considered in the analysis of the data.

By and large, the implementation of the test OSDEs went according to schedule at the sites, except at Delft C.H.C and Vanguard C.H.C. At Delft C.H.C subgroups #6 and #12 correctly completed only three of the 4 test OSDEs (they did OSDE 9 and 10 on the same day, which could then only be taken as one

collective OSDE). At Vanguard C.H.C. subgroup # 10 did not complete the fourth test OSDE. These omissions were accommodated by leaving those particular results out and adjusting the final group sizes when the results were analyzed (see below).

Except for the final OSDE, there was, unfortunately, also no adherence to a fixed time stipulation for the duration of both the practice and test OSDEs at the different sites. Instead, the students were allowed as much time as was needed to complete the folders that were allocated to them during the practice sessions. This resulted in the students being relatively unprepared for the limited time allowed in the final OSDE and it is conceivable that this could have affected the marks (scores) obtained by the students in the final OSDE examination at the different sites, but no special accommodation was made for this in the final analysis of the data.

5.2.4. Assessors involved in the Evaluation of the Students' OSDE Performances

In this study, several types of staff or personnel were used as assessors for the OSDEs at the sites, viz. the pharmacist facilitators, postgraduate student facilitators, academic staff facilitators and an off-site independent assessor.

The **pharmacist facilitators** had a dual function. Firstly, they assisted in the training of the students (including orienting students to the site, etc) as well as serving as mentor and model "dispenser" for the students to emulate.

The students were meant to observe the actions of the pharmacists, ask questions and look for answers as well as use what they had been taught in the on-campus pharmacotherapy course. Interaction with the pharmacist facilitator also gave the student a chance to observe how all their pharmacy subjects could be integrated and used to the benefit of the patient. Secondly, the pharmacist facilitator helped to assess the students, mainly via the OSDEs. This entailed the scoring of the OSDE's done by the students. To facilitate these functions, the pharmacist facilitators were, as part of the study, given limited on-campus training, but no follow-up training and monitoring of their performances as facilitators. This was done intentionally in order to more effectively test the use of the OSDE as a tool to help students learn the skill of dispensing under such practice conditions. All the pharmacist facilitators involved in this study were quite enthusiastic and performed satisfactorily under the prevailing conditions. Many of them were however very apprehensive about their ability to assess the students and wanted more training as was seen by the answers given to the questions asked in the CHESP questionnaires about the assessment process (see Appendix VII).

The role of the **postgraduate student (PG) facilitator** at the site was multifaceted. They acted as tutors guiding and helping the students with any problems that they were experiencing at the site. They also acted as liaisons between the academic facilitators alerting them to any problems that the students were experiencing and any difficulties that arose at the site. Their other duties included the assessment of the students (during the OSDEs), the video-taping of

the OSDE sessions, the averaging of the marks on the OSDE sheets of the students, the collection and safekeeping of the data and the delivery of the data to one of the academic facilitators who acted as a drop off point for all the data of the sites. All the PG facilitators generally understood and performed their function extremely well and were quite effective in this study. While the PG facilitators at three of the sites were well supported by the pharmacist facilitators at the sites, the one at Vanguard received very little support from the pharmacist at that site, due to the latter's workload and consequent inability to fully pay attention to the students. As a consequence all the assessing and other tasks were left to the PG facilitator. This factor of inadequate systems of operation at this site must have played a large role in the managing of the students by the PG facilitator causing him not to be able to fully implement all the procedures set out for the students.

In this study the **academic facilitators** acted as troubleshooters and assisted at the sites where problems were experienced e.g. stood in when or if pharmacist's facilitators went on vacation, helped out when the pharmacist at site Bishop Lavis CHC died, advised on pharmacy layout and procedural problems at Vanguard CHC, etc. They co-coordinated the travel arrangements of the students to and from the sites as well as the compilation and implementation of the progress tests conducted on campus. In addition, they acted as coordinators for the collection of data from the sites, as well as a collection point for the data required by the researcher. Unfortunately two of the appointed academic facilitators were unable to participate in the study due to other commitments.

This left Vanguard CHC without the services of an academic facilitator and this most likely also contributed to the procedural problems that were consequently experienced at this site, although the other two academic facilitators attempted to also assist at this site.

Finally, the study included an **independent assessor** who served as an additional scorer of some aspects (section C) of the final OSDE. This assessor was an academic staff member in the Discipline of Pharmacy Practice, U.W.C who viewed the video recordings of the final OSDE and assessed them on the basis of specific criteria. This was done on campus at the end of the data collection part of

the study. Unlike the other assessors she only assessed section C of the OSDE i.e. the section given the highest marks, the one that was the most difficult to assess (by the pharmacist and postgraduate student facilitators) and the section that was to be used to obtain another measure of the extent of pharmacological knowledge acquired or displayed by the students. Unfortunately, the sound quality of the video records for most of the students were too poor for it to be properly assessed, so that in the end the independent assessor effectively assessed the final OSDE performances of only 10 of the 34 students.

5.2.5 Video Recordings of the OSDEs

At the beginning of the study each PG student facilitator was supplied with a video camera that was to be used to record the OSDEs done at each site. Due to the layout of certain pharmacies and other logistical problems it was however initially not possible to perform the video recordings at some of the sites until

the pharmacy had been changed to accommodate the video equipment, etc. This meant that, at certain sites, video recordings of all test OSDEs did not take place. However, by the time the final OSDE was done most of the logistical problems at the sites had been sorted out and all the sites recorded this test on video. While the pictures were of high standard, the sound quality of some of the videos were however still very poor, mainly due to the background noises, the limited positions possible for the camera and the soft voices of some of the students.

This affected the scoring of the final OSDEs (section C) by the independent assessor, who, as mentioned above, eventually could only effectively assess 10 out the 38 final OSDEs properly. It might have helped if the students had been issued with lapel microphones.

5.2.6 Progress Tests

The students participating in this study did four progress tests, all of primarily multiple-choice question (MCQ) format. See Appendix III for an example. The tests were supposed to be run concurrently with the test OSDEs, but due to a lack of synchronicity of the dates of the OSDE's at the various sites this was not fully possible (see table 5.3). For instance OSDE 1 for the various groups at Delft CHC was conducted over 8 days (i.e. 22 –30 Jul) and for the groups at Bishop Lavis over 3 days (i.e. 22-24 Jul), while the first progress test was taken by all students on 28 Jul 2004.

This resulted in certain students completing more site visits than others before a particular progress test and, as a consequence, perhaps having more knowledge about the site and the drugs used at the site, when the test was done. This caused the results of progress test one, two and three to perhaps not being a true reflection of all the students' abilities. However, by progress test four this problem had been resolved and the final progress test result should have been a good indication of the progress level of all the students at the sites, and this an appropriate summative assessment with which to compare the OSDE (see later)

The progress tests were conducted on campus under classroom examination conditions and monitored by a lecturer. The academic staff on campus marked these tests and the results obtained are discussed under section 5.3.

5.2.7 The Feedback Questionnaires

Finally, feedback from the students and the service providers (pharmacist facilitators) were obtained via the CHESP questionnaires. In the latter questionnaire certain questions pertaining to the OSDE assessment process and the OSDE sheet were added. Only responses of the students in group C were reviewed for the purposes of this study and only certain questions were checked. The main aim with the additional questions asked were to determine whether students used the OSCE to help themselves learn and/or noted that they had different sheets at different periods in the programme. The results of this part of the study are given in table 5.4.

Table 5.3 Dates of the Progress Tests (PT) and the OSDES

Sites	Dates for OSDE and Progress Tests (PT)							
	PT 1	OSDE 1	PT 2	OSDE 2	PT3	OSDE 3	PT4	OSDE 4
Delft CHC	28July	22 July 23 July 29 30	29 Aug	2 Sept 3 27 Aug 28	26 Sept	2 Oct 8 Oct 7 9	27 Nov	14 Oct 14 Oct 15 16
Dr Abd CHC	28 July	22 July 23 July 24 30	29 Aug	13 Aug 27 9 Sept	26 Sept	7 Sept 27 7 Oct	27 Nov	1 Oct 14 Oct 15
Vanguard CHC	28 July	24 July 23 July 30	29 Aug	7 Aug 12 Aug 13	26 Sept	3 Sept 9 Sept 10	27 Nov	25 Sept
Bishop Lavis CHC	28 July	22 July 23 July 24	29 Aug	7 Aug 13 Aug 14	26 Sept	4 Sept 9 Sept 11	27 Nov	10 Sept 25

Table 5.4 Summary of responses of students in group C to select questions on the modified CHESP questionnaire.
*** % = Number of yes responses as a fraction of total students responding.**

Question	Number & percentage of students responding			
	Yes	Sometimes	No	%*
Q 4. Did you check the content of your OSDE sheet and the criteria list before doing any of the assessments during visits which were termed:				
a). Practice	8	2	2	67
b). Test	10		2	83
c). Final	10		2	83
Q 6. Where the OSDE sheets you had different from each other with regard to:				
(a) The content	2		10	20
(b) Scores for individual items	5		7	42
(c) Sheet headings	4		8	33

For the question Q 6 **(*"If you answered "Yes" to any section of question 6 above, what changes occurred on the OSDE sheet with regard to: (a) Content (b) Scores for individual items and (c) Sheet headings"*)** there were only 4 responses and these are given below:

- Response (1)
  Content: ***More marks were allocated to certain areas***
  Scores for individual items: ***More marks allocated to certain areas***
  Sheet headings: ***Each sheet was for a particular session***.

- Response (2)
  Sheet Headings: ***Some said OSDE and there were SPP things on it***

- Response 3
  Scores for individual items: ***Some scores were more than previous sheets.***

- Response 4
  Scores for individual items: ***other sheet carried more marks than others***
  Sheet headings: ***Some had PP1/PP2 or were plain***

The rest of the group declined to answer this section thus there was no way of knowing whether they knew about the changes or not.

Collectively, from these results it was thus not clear whether the students in group C noticed the changes that had been made to the content, the scores for individual items or the sheet headings in the OSDE sheets. For the relevance and further interpretation of this observation see below.

Overall, it can be concluded (from section 5.2) that most aspects of this study were, at least, partially implemented according to the original plan. In some instances some aspects of the implementation of the study, as discussed above, could not be fully implemented as required and this needed to be taken into consideration when the evaluation of the OSDE as an assessment tool was considered.

5.3 Evaluation of the OSDE as an Assessment Tool

The primary objective of the present study was to ascertain whether the OSDE could be used as a tool to assess the competence (i.e. summative assessment) and the progress towards such competence (i.e. formative assessment) displayed by the students participating in the pharmacotherapy course.

5.3.1 The OSDE as a Summative Assessment Tool to Measure Competency in Dispensing

To determine whether the OSDE was an effective summative assessment tool the results of the final OSDE were analyzed and compared with that obtained in another summative assessment test, viz. the progress test.

The results of the final OSDE test for the three groups are shown in table 5.5. From these results, it can be seen, that the average mark for the three groups was 74.6 ± 2.08 %. The marks for Groups A and C were similar i.e.70. 7 ± 4.31 % and 70.8 ± 3.80 %, respectively, while students in group B received the highest averaged final OSDE score of 82.3 ± 2.33 % overall. However, when the marks of the three groups were compared no significant differences (ANOVA test; $p = 0.0601$) were found. This suggests that the students were equally competent in the final OSDE examination and that no one group of students had an advantage over any of the other groups despite the differences in the OSDE format that were used in the practice period.

There is, however, generally doubt that the OSCE on its own is a good summative assessment tool (Mavis, B.E. 2002). Thus to gain some perspective on this, the results obtained in the final OSDE were also compared with that obtained using another summative measure, viz. a MCQ format progress test. The average mark for the final progress test for the entire class was 63.4 ± 2.2% (n = 37, table 5.5). When the final progress test (i.e. test # 4) marks of the students in the three groups (A, B & C) were analyzed, no statistical difference (ANOVA; p = 0.31) was noted, among the group scores, a trend similar to that found with the final OSDE test results. However, when the marks for the final progress test and the OSDE for all the students were compared no correlation (Pearson correlation test; r^2 = 0,02) could be found between the scores for the OSDE and the progress tests. If the progress test is an accepted summative assessment tool, this result implied that the OSDE might not be.

However, in some other sense the lack of correlation between the OSDE and the progress test mark was perhaps also not entirely unexpected since the progress test and the OSDE measured different skills and also differed in the manner in which they were scored (i.e. in the reliability of the scoring). For example, whereas the progress test measured the students knowledge of the drugs used at the site and principles of pharmacotherapy that they had learnt on campus, the OSDE measured their dispensing skills i.e. competency (Wood,V.1982 & Woodley,A.S. 1977). Indeed, it has previously been suggested that the relationship between critical knowledge (measured in progress test) and practical competence (in this instance measured by the OSDE) may be quite poor (Jones, A., Whitaker, A. 1975).

On the other hand, the lack of correlation between the OSDE and the progress test scores could also have been due to differences in the reliability in scoring with the two assessment tools. The progress test was a multiple choice questionnaire (MCQ) which, due to the standardized way that multiple choice questions are marked, did not require critical judgment or expertise on the part of the scorer, and would not have allowed the assessor to influence the score in any way. As Makoni puts it "The MCQ tend to be high on reliability and low on validity and there is a danger that they only assess trivial knowledge," (Makoni, S. 2000). The MCQ is a type of test that avoids the qualitative judgments that would be expected from a scorer judging an OSDE. The assessor of an OSDE test would have to follow a more holistic approach to measuring a student's performance, making use of set criteria decided on before hand (Wilkin, N.E S.2000). This is required to enhance the reliability of the test. The OSCE is inherently unreliable in it's scoring, as there are normally more than one scorer involved (Woodburn, J. et al 1996). Moreover, because of the specific objective of the present study (i.e. to observe the OSDE as an assessment tool under the prevailing practical circumstances e.g. more than one scorer, formerly untrained scorers, etc), only minimal criteria and training were given to the scorers and their ability as assessors was not tested before the study. (The fear was that if the scorers had been given too much information beforehand it could have influenced the results). Under these circumstances the reliability of the OSDE results was bound to be questionable (Woodburn, J. et al 1996).

Overall, from the above comparisons it is thus difficult, at this stage, to conclude that the OSDE is an effective tool for the summative assessment of the students in their programmes.

Table 5.5. Results of the first and final tests of the Progress test and OSDE test for groups A, B and C.

Groups (With N = students)	Average marks (% + SEM) obtained in the OSDE and Progress test (PT) in both the first and final tests (in n subjects)			
	Test 1 PT	Test 1 OSDE	Test 4 PT	Test 4 OSDE
Group A	53.5 ± 4.12 n = 10	64.65 ± 3.97 n = 13	58.00 ± 4.48 n = 13	70.74 ± 4.31 n = 11
Group B	48.33 ± 4.42 n = 9	77.71 ± 4.46 n = 12	66.46 ± 6.08 n = 12	82.26 ± 2.34 n = 11
Group C	51.25 ± 4.357 n = 12	78.08 ± 4.77 n = 14	63.46 ± 3.943 n = 12	70.83 ± 3.52 n = 12
GroupA+B+C	51.13 ± 2.526 n = 31	68.51± 2.446 n = 39	63.38 ± 2.236 n = 37	74.50 ± 2.293 n = 34

Another objective of the study was to see if group C, i.e. those students using the special sheet, would fair better than groups A and B in the final summative assessment. The results however showed that the final test OSDE mark (70.83± 3.5%) of the group C students (i.e. those given the special OSDE sheets) was not statistically different (t-test; p = 0.9902) from the marks obtained by group A (70.74 ± 4.31%), and was in fact significantly lower (t test; p= 0.0205) than that of group B (82.26 ± 2.34 %). The marks for group B was also significantly higher (t-test; p = 0.0205)

than that for group A, implying that the students in group B performed better overall.

From these results, one would thus have to conclude that use of the special OSDE did certainly not help the students of group C to perform any better than those in groups A and B in the final OSDE test.

Collectively, the results obtained in this study was (mainly due to the lack of reliability in scoring which in turn affected the validity) thus inconclusive on whether the OSDE is an effective summative assessment tool to measure the competency of the students in dispensing and, secondly, strongly suggested that the use of the special OSDE sheets did not lead to enhanced final competency of the students.

5.3.2 The Special OSDE as a Formative Assessment Tool to Measure and Aid Progress toward Competency in Dispensing

If the OSDE is a useful formative assessment tool, it was assumed that a comparison of the scores the students obtained before and after the practice OSDE could be used to measure the effectiveness of the practice OSDE as a tool to aid progress towards students' competency in the skill of dispensing. From the results, summarized in table 5.6, it can be seen that the average marks obtained for OSDE test #1 (pre-practice) by the combined group A, B, + C and individual groups A, B, and C students were 68.69 ± 2.42%; 64.65 ± 3.87%; 74.16 ± 4.26% and 67.26 ± 4.41 %, respectively. There was no statistical difference (ANOVA; p = 0,2841) between the marks of the three groups,

suggesting that the competency in dispensing of the three test groups of students were comparable at the start of the study.

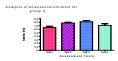
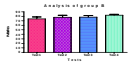
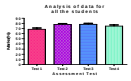
If the OSDE, in general, is an effective tool for formative assessment (Mavis, B. 2002) of progress (in dispensing skill) one would expect that the students' marks would be higher in later tests (e.g. tests # 2 and 4) after they had practiced with the OSDE. Moreover, in this study we hypothesized that the increase in marks for group C (who used the special OSDE sheets), would be even greater than that attained by the other 2 groups. All three groups scored higher in test 4 compared to test # 1, the increase in scores for groups A, B and C and combined group A, B + C, being 5,92 ± 0,45 %; 6,09 ± 1,95 %; 8,10 ± 0.61 % and 3,57 ±0,34 %, respectively, but each increase was not statistically significant (t-test, p = 0,32; p = 0, 12; p = 0,09 and p = 0,081, respectively). These results suggested that there was no significant increase in the students' dispensing skill over the period. Further, the scores attained by group C was no different (ANOVA; p = 0,4765) from that obtained by the other two groups, suggesting that the special OSDE was no better as a tool to aid the development of the students competence in dispensing than the generic and generic plus feedback OSDE's.

But, perhaps, the greatest impact of the OSDE tool and the highest level of progress would have been expected at test # 2 i.e. after 4 weeks of practice and concerted use of each the different OSDE's. For groups A, B and C increases of 13.1 ± 1.68 %;

3,55 ± 0,45 % and 10.82 ± 0.29 %, respectively, occurred in the marks from test 1 to 2 (see Table 5.6).

All of these increases, with the exception of group A (t-test p = 0,007) were however not statistically significant. Again, the increase in marks for group C (i.e. the students who had the special OSDE sheet during practice) vs. the increase in marks for groups A and B were also not significantly different (t-test; p = 0,98 and p = 0,85, respectively).

Table 5.6 Results of final test scores for the groups

Groups	Test 1	Test 2	Test 3	Test 4	Trend at Site
Group A	**64.65±3.86** **n = 12**	**77.76 ± 2.19** **n = 13**	**81.07 ± 3.70** **n = 12**	**70.74 ± 4.31** **n = 11**	
Group B	**74.16 ± 4.28** **n = 12**	**77.71 ± 4.73** **n = 11**	**78.18 ± 3.66** **n = 11**	**82.26 ± 2.33** **n = 11**	
Group C	**67.26 ± 4.41** **n = 14**	**78.08 ± 4.12** **n = 11**	**75.10 ± 3.96** **n = 13**	**70.83 ± 3.80** **n = 12**	
Groups A+B+C	**68.69 ± 2.42** **n = 39**	**77.84 ± 2.10** **n = 35**	**78.11 ± 2.20** **n = 36**	**74.61 ± 2.08** **n = 34**	

Collectively, these results suggest that, in this study, the special OSDE sheet was no better at aiding student progress than the two other OSDE assessment tools used.

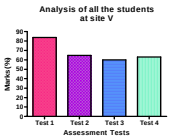
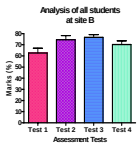
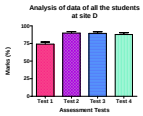
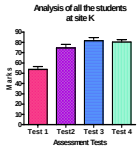
In other studies, the Objective Structured Clinical Examinations (OSCE) has however been proven to be an effective formative assessment tool, (Mavis, B. 2002) especially when conducted under certain controlled conditions. These conditions included the following (Shaw, L.2002). Firstly, in an OSCE there are always a number of workstations and the use of this assessment format allows the controlled exposure of students to a wide variety of clinical skills to be tested within a relatively short time period (Belcher, D. et al 2000). Secondly, the objectivity of the OSCE is maintained through the use of pre-designed report forms and checklists (Martin, I. et al 2002). Thirdly, a single examiner is maintained at each station and scores all the students during the examination using criteria that grades the task.

None of these conditions did however apply in the case of the Objective Structured Dispensing Examination (OSDE's) done in this study and this may have contributed to the inconclusive results obtained. Firstly, unlike normally for the OSCE, the OSDE did not take place at workstations under controlled conditions. Each site (Kemahli, S.2001) acted as a large workstation and although the sites were essentially similar in terms of their patient numbers and diseases treated, this was where the similarity ended. The results obtained at the various sites showed vast differences (see table 5.7) that could have been due to a number of factors (e.g. the different competencies of the pharmacist facilitators at the sites and the manner in which they assessed the students, the actual specific prescriptions the students had to fill, etc).

To further analyze the influence that the different sites might have had, the average OSDE scores obtained for test #1 vs. test # 4 at the Delft, Dr Abdurahman, Bishop Lavis and Vanguard CHC sites were compared (see table 5.7). There were statistically significant (t-test, p = 0,0002; p = 0,0003 and p = 0,0181) increases in scores between test 1 and test 4 of 13 ± 0,36%; 27 ± 0,33% and 8 ± 1,03%, for Delft, Dr Abdurahman and Bishop Lavis sites, respectively. At Vanguard CHC a decrease in score of 18,71± -1,26% between test #1 and test # 2. was actually obtained. Collectively, these results indicated that there were improvements in the dispensing skills of the students at all the sites except for those at Vanguard CHC. The latter was also the site where the practice OSDEs was not implemented as per protocol (see 5.2.4 above). Taken together, these 2 findings strongly suggest that it was the practice (with OSDEs), at the other sites, which contributed to the increase in dispensing skill of the students.

It thus seemed logical, for analysis purposes to remove the scores obtained by the students visiting Vanguard CHC from the overall group (for A, B and C) scores. When this was done, the following results were obtained (see table 5.8).

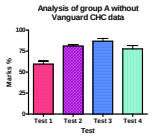
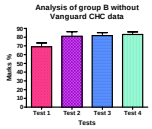
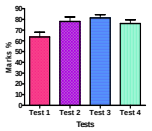
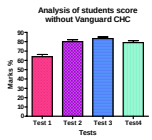
Table 5.7 Results of scores at the sites for the four OSDE tests

Name of Site	Test 1 %	Test 2 %	Test 3 %	Test 4 %	Trend at Site
Vanguard CHC	**83.69 ± 3.43 n = 9**	**64.98±2.17 n = 5**	**59.64±1.95 n = 8**	**59.80 ± 4.31 n = 8**	
Bishop Lavis CHC	**62.64 ± 4.34 n = 9**	**74.59± 3.67 n = 9**	**76.75± 2.43 n = 8**	**70.28 ± 3.31 n = 8**	
Delft CHC	**74.15 ± 3.05 n = 11**	**89.99 ± 177 n = 11**	**90.30 ± 2.86 n = 7**	**87.72 ± 2.69 n = 7**	
Dr Abd.CHC	**53.74 ± 2.72 n = 10**	**74.57 ± 3,38 n = 10**	**81.47 ± 3.15 n = 9**	**80.30 ± 2.39 n = 10**	

Now, once the scores of the students at Vanguard were removed, there were greater increases (i.e. 17,97 ± 0,41%; 14,18 ± 1,55 %; 12.55 ± 1,09 % and 15,14 ±1,46%) in the scores between test #1 and #4 for groups A, B, C and A+B+C, respectively. Once the scores of the students at Vanguard were removed, there were also statistically significant (t-test, p <0,0001; p = 0,0051, p = 0,002

and p<0,0001) improvements in the scores between test 1 *vs.* test 2 for groups A, B, C and A+B+C (i.e. 21,50 ± 2,23%; 18,09 ± 0,79 %; 14,44 ± 0,41% and 16.10 ± 0,31%, respectively).

Table 5.8 Revised results of scores of students without Vanguard CHC students

Group	Test 1 %	Test 2 %	Test 3 %	Test 4 %	Trend of site
Group A	**59,62±3, 70 n=10**	**81,12±1, 47 n= 10**	**86,78±3, 29 n = 9**	**77,59±4.11 n= 8**	
Group B	**68,96±4, 34 n= 9**	**87,05±5, 13 n=9**	**87,85±3, 27 n= 9**	**83,14±2, 79 n = 9**	
Group C	**63,64±4, 53 n=11**	**78,08±4, 12 n=11**	**81,43±2, 80 n= 10**	**76,19±3.44 n = 9**	
Group A+B+C	**63,89±2, 46 n = 30**	**79,99±2, 15 n = 30**	**83,29± 1,79 n = 28**	**79,03± 1,00 n = 26**	

However, despite the improvements in the test 1 vs. test 4, the increase in scores of group C was still not significantly different from that obtained by the students of groups A and B. In other words, although the influence that site might have had was removed (i.e. by omitting the Vanguard site data), the hypothesis that

the use of the special OSDE would lead to better progress than that attainable with the use of the generic OSDE or generic OSDE plus feedback, could still not be accepted.

Collectively, the results obtained thus suggested that the OSDE was a viable formative assessment tool (i.e. could show increases in competency), but that the special OSDE sheet was no more effective than the generic or generic plus feedback methods to help students increase their dispensing skill.

5.4. The Special OSDE as a Tool to Increase Specific Knowledge in Pharmacology

A final objective with this study was to determine whether the use of the special OSDE could increase the specific knowledge in pharmacology of the students participating in the pharmacotherapy course. For this analysis, the marks obtained by group C students for section C of the final OSDE were compared to that obtained by the students in groups A and B. Section C of the OSDE sheet contained the items where, in the special OSDE (for group C students), the marks were changed during the practice visits. These changes were supposed to alert and direct the students to those items in the section that were important and in this way focus their learning. In line with the problem-based nature of the course the students were supposed to discover this for themselves, and act upon it.

In table 5.9 the scores obtained for items C1 to C4 by the students in the modified groups A, B and C (i.e. Vanguard students excluded) and in table 5.10 a summary of the statistical analysis of this data are given, while Table 5.11 shows the change in average scores (with trend lines drawn through it) which the

students in the various groups (A, B, C) obtained for each of the section C items in OSDE tests 1,2 and 4.

Firstly, (see yellow blocks of table 5.9) there was statistically significant difference in the average score obtained by the students in group A, B, and C in OSDE test #1 for the combined set of section C items (i.e. section C1, C2, C3 plus C4) (ANOVA, $p = 0.0009$), suggesting that the students were not similar in the abilities measured by these items. There was however no statistically significant difference (ANOVA, $p = 0.1861$) between the groups in the average scores obtained for the section C items at the time when OSDE test # 4(see green blocks of table 5.9) was done, indicating that they were similar in abilities at the end of the period (also see table 5.10).

The groups were thus not equally matched in pharmacological knowledge at the start and the end of the visits to the sites. The use of the different OSDE thus did not appear to have made any difference and the hypothesis that the special OSDE would more effectively facilitate the learning of the specific pharmacological knowledge used in pharmacotherapy was not proven.

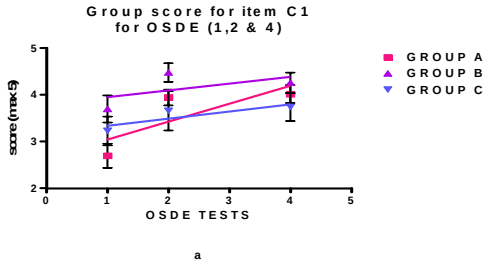
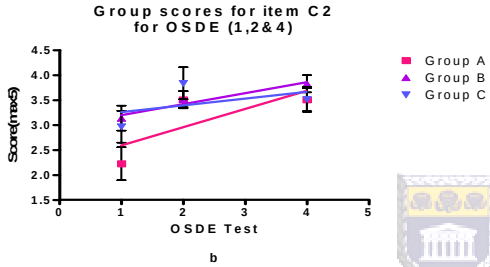
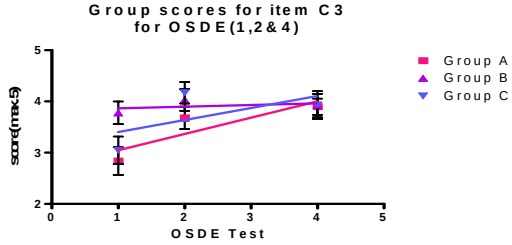
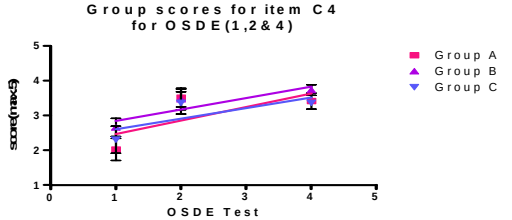
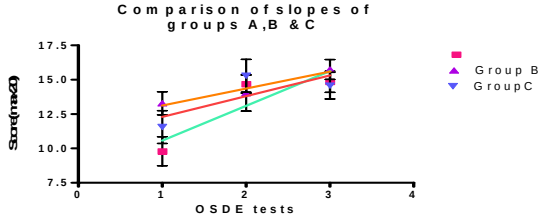
Table 5.9 Average scores for Section C items obtained by students in groups A, B and C during OSDE 1,2 and 4

Average C Item Marks (out of 5)									
Items	**Group A**			**Group B**			**Group C**		
	OSDE 1	**OSDE 2**	**4**				**1**	**OSDE 2**	**OSDE 4**
C1	2,7±0.26 n= 10	3.95±3.95 n= 6	4.02±0.19 n= 10	3.7±0.29 n= 9	4.48±0.20 n= 9	4.26±0.22 n= 9	3.23±0.31 n= 11	3.66±0.42 n=9	3.74±0.30 n= 9
Slope	0.3821±0.3006 7.6%			0.1443± 0.2202 2.88%			0.1514±0.0965 3.02%		
C2	2.22±0.33 n= 10	3.5±0.17 n = 6	3.5±0.23 n = 10	3.13±0.25 n = 9	3.51±0.16 n=9	3.82±0.17 n = 9	2.96±0.32 n = 11	3.83±0.32 n = 9	3.51±0.25 n = 9
Slope	0.3657± 0.3167 7.3%			0.2193± 0.05567 4.38%			0.1343±0.2549 2.68%		
C3	2.84±0.27 n=10	3.68±0.22 n = 6	3.9±0.16 n = 10	3.78±0.22 n=9	4.03±0.21 n = 9	3.92±0.23 n= 9	3.05±0.27 n = 11	4.17±0.21 n=9	3.93±0.27 n=9
Slope	0.3186±0.1806 6.38%			0.0321± 0.7547 0.64%			0.2343±0.3068 4.69%		
C4	2.03±0.32 n= 10	3.52±0.27 n= 6	3.42±0.23 n= 10	2.66±0.26 n = 9	3.47±0.30 n= 9	3.74±0.15 n = 9	2.31±0.39 n = 11	3.37±0.32 n=9	3.37±0.28 n= 9
Slope	0.3900±0.3811 7.8%			0.3279± 0.1670 5.5%			0.3029±0.2623 6.46%		
All C Items	2.45±0.30 n	2.91±0.21 n =6	3.71±0.20 n	3.32±0.26	3.87±0.44 n = 9	3.94±0.19	2.89±0.32	3.76±0.27 n = 9	3.64±0.28
Slope	0.6300±0.09815 12.6%			0.3100±0.1386 6.2%			0.3750±0.2858 7.5%		

Table 5.10. Summary of Results of statistical analysis of C item marks for Groups A, B and C.

Item number	OSDE #	Group scores compared	Statistical Test	P value	Significant
C1	1	A, B, C	ANOVA	0,0731	S
		C vs. A	t- test	0,2146	NS
		C vs. B	t-test	0,2603	NS
	4	A, B, C	ANOVA	<0,0001	S
		C vs. A	t-test	0,4419	NS
		C vs.B	t-test	0,1813	NS
C2	1	A, B, C	ANOVA	0,1066	NS
		C vs. A	t-test	0,2362	NS
		C vs. B	t-test	0,5450	NS
	4	A, B ,C	ANOVA	0,553	NS
		C vs. A	t-test	0,9118	NS
		C vs. B	t-test	0,3851	NS
C3	1	A, B, C	ANOVA	0,0499	S
		C vs. A	t-test	0,5896	NS
		C vs. .B	t- test	0,0572	NS
	4	A, B, C	ANOVA	0,0168	S
		C vs. A	t- test	0,9231	NS
		C vs. B	t- test	0,9779	NS
C4	1	A, B, C	ANOVA	0,0022	NS
		C vs. A	t-test	0,5898	S
		C vs. B	t-test	0,4863	NS
	4	A, B, C	ANOVA	0,4552	NS
		C vs. A	t- test	0,7402	NS
		C vs. B	t- test	0,0521	NS
All C items	1	A, B, C	ANOVA	0,0009	S
		C vs. A	t-test	0,7402	NS
		C vs. .B	t-test	0,7309	NS
	4	A,B, C	ANOVA	0,1861	NS
		C vs. A	t-test	0,9415	NS
		C vs. B	t-test	0,7488	NS

Table 5:11 **Graphs and statistical comparisons of the scores obtained by Group A, B and C students in the Section C items of OSDEs 1, 2 and 4. The trend lines were obtained by linear regression and statistical analysis by paired t-test.**

Item	Scores (in %) obtained by Group A, B and C students for select items (C1 to C4) in OSDE tests 1,2 and 4.	Probability (p) for Group C *vs.* Group A; (t – test)	Probability (p) for Group C *vs.* Group B; (t – test)
C1	 a	OSDE 1: p 0,2146 OSDE 4: p 0.4419	OSDE1:p = 0,2603 OSDE 4: p = 0.1813
C2	 b	OSDE 1: p=0,23 OSDE 4: p=0,91	OSDE 1: p= 0,54 OSDE 4: p = 0,39
C3		OSDE 1: p= 0,58 OSDE 4: p= 0,92	OSDE 1: p= 0,057 OSDE 4: p = 0,97
C4		OSDE 1:p=0,05 OSDE 4: p=0,74	OSDE 1: p=0,48 OSDE 4: p=0,05
All C items		OSDE 1: p=0.74 OSDE 4 : p =0.94	OSDE 1: p=0.73 OSDE 4: p=0.75

Secondly, there were consistent, but small increases in the marks for the section C items from OSDE test 1 to OSDE test 4. For instance, the average score obtained by the group A, B and C students for the combined set of section C items (i.e. all C items in table 5.9) increased at small comparable rates (ANOVA = 0.7823) of 12.6, 6.2 and 7.5 % test from OSDE 1 to OSDE 4, respectively, signifying that a small but statistically insignificant (F test; $p = 3.45$; $p = 18.9$; 1.37) , respectively, level of learning on these items occurred in each group of students over the 8 – week period. There was also no difference in the average marks of group C vs. group A (t-test, $p = 0.36$); group C vs. group B (t-test, $p =$ 0,66) and group A vs. group B (t-test, $p=$ 0,413) which, suggests that no one group performed better in this section, and the special OSDE did not help group C to perform better in this section.

Thus it appears that the special OSDE was no more effective than the other two sheets in improving the specific pharmacology knowledge of the students in this pharmaotherapy course.

The above conclusions are however all dependent upon whether the students actually noticed that the three sheets were different. To ascertain whether this was the case, the CHESP questionnaire (Appendix I) was used to collect the data for this part of the study and the results that were obtained are summarized in table 5.4. Of the twelve group C students, ten (i.e. 83 %) said that they had noticed changes in the practice OSDE sheet, yet only four of them responded to the follow-up question asking what those changes were. Thus, despite the large number of students who said they noticed the changes, there was no way of knowing for sure that they did do so. This low level of detection of the changes by the group C students implies that most of them probably did not use the sheet to

guide their learning and this would have impacted greatly on the section C scores obtained by the group.

Another factor that may have produced the results pertaining to the improvement in pharmacology knowledge could have been the reliability of the assessors' scoring of these items. To assess the reliability of the scoring of this section, an independent assessor was used as an unbiased, objective, standardized scorer. The independent assessor scored the students' responses for section C using the videotapes of the final OSDE, checking the student's responses against the criteria list that had been drawn up for her (see Appendix VII). The responses of ten students were checked in this way. Each student completed a maximum of three to six folders in their final OSDE test. The total amount of folders that the independent assessor checked amounted to 59 folders involving a total number of 223 drugs.

In table 5.12 the scores given to the students for section C by the independent assessor are compared to that given by the other assessors at the site (i.e. pharmacist facilitators, postgraduates and academic facilitators). First and foremost, the scores given by the independent assessor, for all the items, were significantly lower (t-test, $p<0,0001$) than that given by the other scorers.

According to the analysis report of the independent assessor, the students, for item C1 (i.e. name of drug), very seldom gave the trade name and the strength of the drug to the patient, yet the on site assessors did not penalize them for this omission.

This could be one explanation for the high scores relative to that of the independent assessor that were thus given by the on-site assessors. For item C2, the one dealing with the **effect of the drug** (i.e. the mechanism of action of the drug, site of action and pharmacological group), the high scores of the on site assessors probably arose because, firstly no criteria checklist was given to them, secondly, they judged the information given by the student according to its appropriateness for the type of person collecting the medication (i.e. if it was the patient him/herself or another a person collecting the medication), and, thirdly, they appeared, for certain types of drugs (e.g. anti-psychotic drugs such as lithium carbonate, etc. for which the mechanism would be extremely difficult to explain considering the mental state of the patient), to rather judge how the student handled the situation more than how much information was provided to the patient.

Table 5.12. Results of scores for items for section C by the independent assessor and the assessors at the sites.

Item of Section C	Average Scores (%±SEM) given by		t-test (paired)
	Independent Assessor	Assessors at site	
C1	58,42 ± 2.51	71.93 ± 5,40	p< 0,0001
C2	22,96 ± 1.81	64.83 ± 8,2	p< 0,0001
C3	44,82 ± 1,28	72.87 ± 9.32	p< 0,0001
C4	8,32 ± 1.23	67.26 ± 3.77	p<0,0001

Item C3 dealt with **the instructions for use** and, according to the independent assessors' report, the students seldom mentioned the route of administration, special instructions and when the drug was to be taken (i.e. whether before or after food). The on-site assessors apparently did not consider these criteria to be of vital importance and marked only three of the five criteria (i.e. amount, frequency and whether taken with /after food) consistently which then resulted in their high scores.

Finally, the students, according to the independent assessor, also very seldom answered item C4 that dealt with adverse effects/cautions and warnings, even though the on site scorers, again, scored the item high. Reasons for this may have been that the on site scorers were unsure how to score when the medication had no significant adverse effects and when giving the information about adverse effects might have increased the risk of the patient becoming non- compliant as a result of the information given. Another reason may have been the presence of a "halo effect" (Neufeld, V., Norman, G. 1985) arising in this situation where the pharmacist facilitator scored the students' dispensing skill by direct observation only (and not other additional tests as well). Since the scoring is influenced by the interpersonal relationship between the student and the pharmacist facilitator, students who appeared motivated and attentive to patient care were, according to the halo principle, usually graded higher for their knowledge than their performance in the actual knowledge testing (e.g. progress tests) demonstrated (Quarrick, E.A.et al 1972), something which may also have occurred in this study. Such factors were however, not taken into account by the independent assessor and might have contributed to the large difference in the scores of the independent assessor and the on site assessors.

In summary, there was a only a small insignificant increase in the overall score of all the students for the section C items from OSDE test 1 to OSDE test 4 suggesting that there was no real increase in the students pharmacological knowledge (and the problem of unreliability of data from the on site assessors probably contributed to this result). The hypothesis that the students using the special OSDE would gain higher pharmacological knowledge, could also not be proven i.e. it appeared that the special OSDE was no more effective than the other two sheets in improving the specific pharmacology knowledge of the students in this pharmacotherapy course.

CHAPTER 6

Conclusions and Recommendations

The primary objectives of this study were to firstly design an OSDE (Objective Structured Dispensing Examination) that could be used to evaluate students being trained in a pharmacotherapy course and, secondly, to evaluate whether the OSDE could be used to facilitate their learning. The hypothesis to be tested was that, students whose progress were assessed through regular exposure to a specially designed OSDE (i.e. one in which higher marks are given to pharmacological aspects) and an OSDE with feedback afterwards during the early parts of the time spent at the site (formative assessment) would (a) show increasing competence (as measured by OSDE scores, video and reports/ assessments/ feedback from facilitators) over the course of the program, and (b) gain higher marks in the final assessments (summative assessments).

Although several difficulties (e.g. workflow problems, etc) were encountered in the implementation of this study in the real work environment, none of these were associated with the OSDE design nor did they prevent the testing of the OSDE at the sites. And, the following major conclusions may be drawn from this study:

(1) ***The OSDE as a summative assessment tool.***

Collectively, the results obtained in this study were inconclusive on whether the OSDE was an effective summative assessment tool to measure the students' competency in dispensing. This was mainly due to the suspected lack of reliability in the scoring of the OSDE, which, in turn, affected its validity.

In particular, the use of the special OSDE, was also no better than the generic OSDE and generic OSDE plus feedback to enhance the final competency of the students. This result only served to further highlight the need for assessment tools to measure competency in dispensing in real work environments and that further research is required to discover, conclusively, whether the OSDE can be used alone as an summative assessment tool to assess skill in dispensing.

(2) ***The OSDE as a formative assessment tool.***

The results obtained suggested that the OSDE is a viable formative assessment tool; its use resulted in significant improvements in student competency in dispensing. However, the special OSDE sheet was no more effective than the generic OSDE or generic OSDE plus feedback methods for this purpose. The hypothesis that the special OSDE would enhance the students learning and help them to perform better could thus not be proven (probably mainly due to the procedural problems experienced at some sites). Further research needs to be done on the special OSDE to discover if, when the implementation of the special OSDE at the sites is improved, it might still not be better than the other two as a formative assessment tool.

In addition, in this study the use of the OSDE did not significantly increase the students' pharmacological knowledge and the special OSDE was no better than the generic OSDE or the OSDE with feedback, at aiding the students learning.

Finally, the major finding of the study was, that there was a definite increase in the overall score of the students from the first (OSDE test 1) to the last (OSDE test 4) assessments. This indicated that there was an increase in their competency in dispensing, presumably aided by the use of the OSDE sheet as an assessment tool, despite the problem of lack of reliability in the on site assessors' scoring. The hypothesis that the special OSDE would be better than the generic OSDE and the generic OSDE plus feedback however remains untested.

From the results obtained and the difficulties encountered in implementing this assessment tool in a real work environment, it is clear that several factors that might influence the reliability of the scoring still have to be addressed. These include, among others, (1) educating the pharmacist facilitator in the assessment process, (2) upgrading the pharmacological knowledge of the pharmacist facilitators, and (3) compiling a comprehensive criteria sheet that would state the specific outcomes expected in each section of the OSDE sheet. If these factors are appropriately addressed, the scores obtained using the OSDE sheet might be more accurate, reliable and valid and its true worth as an assessment tool more effectively realized. Clearly the OSDE offers a new option for the objective assessment of the skill in dispensing.

SUMMARY

The primary objectives of this study was to design and evaluate an OSDE (Objective Structured Dispensing Examination) that could be used to assess students being trained in a service- learning course. It was hypothesized that students whose progress were assessed through regular exposure to a specially designed OSDE during the early parts of the time spent at a pharmacy practice site (formative assessment) would show increasing competence over the course of the program, and gain higher marks in the final (summative) assessments.

A special OSDE was designed and used to assess final year pharmacy students being trained at pharmacies in primary community health care centres in the Western Cape, South Africa. The special OSDE contained specific sections focusing on and measuring competence in dispensing and specific knowledge of pharmacology. Forty students were divided into 3 groups of equal academic abilities. Each group spent 8 weeks at one of the sites where they were trained by facilitator pharmacists using the special OSDE (Group C), a generic OSDE plus feedback (Group B) or a generic OSDE (Group A). To test the effectiveness of the special OSDE as a formative assessment tool the results of the group C students after 1 week (OSDE1), 3 weeks (OSDE 2), 7 weeks (OSDE #3) and 10 weeks (OSDE 4) at the site, relative to the results for groups A and B students, were compared. In addition, the students were assessed using MCQ format progress tests and the effectiveness of the OSDE as a summative tool determined by comparing the results obtained in these and the OSDEs.

Finally, to confirm student and pharmacist' understanding of the OSDE process a post-study survey was conducted and to verify the reliability of the facilitator scoring some of the students' assessments were recorded on video and reassessed by an independent assessor.

Several difficulties were encountered in the implementation of the study in thepractice environment, but none of these were associated with the OSDE design nor prevented the implementation of the OSDE at the sites. No significant differences (ANOVA; $p = 0.0601$) were found in the marks for students in groups A, B & C for OSDE # 4, viz. 70.7 ± 4.31; 82.3 ± 2.33 and $70.8 \pm 32.8\%$, respectively, indicating that the students were equally competent in the final OSDE. There were also no differences (ANOVA; $p = 0.31$) between the groups in the final progress test marks i.e. 58.0 ± 4.48; 66.46 ± 6.08 and $63.0 \pm 3.94\%$ for groups A, B & C, respectively. In addition, there was also no correlation (Pearson correlation test, $r^2 = 0.02$) between the marks obtained with the 2 types of test suggesting that the two summative tests most likely measured different skills making it difficult to conclude whether the OSDE was an effective summative assessment tool or not. When un-validated marks were omitted, there were significant increases of 17.97 ± 0.41; 14.18 ± 1.55 and $12.55 \pm 1.09\%$ (student t- test; $p < 0.0001$; $p = 0.0051$ & $p = 0.002$) in the marks from OSDE #1 to OSDE #4 for Groups A, B and C suggesting that the OSDE was a viable formative assessment tool. The special OSDE sheet was however no more effective than the generic or generic plus feedback OSDE. The groups were significantly different in their pharmacological knowledge (section C of the

OSDE) at the start (i.e. OSDE 1, ANOVA $p < 0.0001$) and end (i.e. OSDE 4, $p < 0.0236$), but there was no difference between the groups in the rate of improvement over the 4 tests (ANOVA, $p = 0.9345$). Finally, the marks given in the video-recorded student OSDEs by an independent assessor for the items dealing with pharmacology were significantly (student t-test; $p < 0.0001$) lower than the marks originally given by the pharmacist facilitators at the practice sites, suggesting that the scoring by the assessors may not have been completely reliable.

From these results it is concluded that the OSDE could be implemented in a service- learning course for undergraduate pharmacy students and that it could be used as a formative assessment tool for the development of the dispensing skills of the students. It is still unclear whether it is useful as a summative assessment tool. Further, the specially designed OSDE was, as an assessment tool, no better than the generic OSDE or the generic OSDE with feedback. Finally, the pharmacological knowledge of the students might be improved with the use of the OSDE, but a suspected lack in the reliability of the scoring of this section by the pharmacist facilitators did not allow a final conclusion on this point to be drawn.

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APPENDICES

APPENDIX I MODIFIED STUDENT QUESTIONNAIRE

CHESP STUDENT QUESTIONNAIRE[1]

Dear Student

This survey forms part of a nationwide research project which investigates the effect of community-based service learning on the different participants (students, community members, university lecturers, service partners).

You are being asked to complete this questionnaire because you are enrolled in a course which had a community and service-learning component. We are very interested to find out what the impact - if any –of this involvement has been on you. We particularly want to know how this experience has influenced your perspective on learning, your view of service, your choice of major/career, and your perspective of working in diverse communities.

UNIVERSITY: ……

TITLE OF COURSE:

……

DEMOGRAPHICS

First, we would like to know some information about you.
(Please circle the correct response).

1. Gender

Female	1
Male	2

2. Race

Asian	1
Black	2
Colored	3
White	4

3. What is your age? …….. (years)

4. Which year of study are you currently in?

First-year	1

[1] Sources: Gelmon et al (2001) *Assessing service-learning and civic engagement*. Campus Compact; Reeb, R.N. et al (1998) The Community service self-efficacy scale: Evidence of reliability, construct validity and pragmatic utility. *Michigan Journal of Community Service Learning*.

Second year	2
Third year	3
Fourth year/ Honours	4
Masters	5

5a. Do your have a part-time job?

Yes	1
No	2

5b. If YES, please describe the nature of the job.

……

5c. How many hours – on average – do you spend per month on this job?

……

6. Name of service agency or service provider you worked with during the course (where appropriate):

……

WHAT YOU HAVE LEARNED FROM THE COURSE

7. Next, we would like to gain your perspective about this community-based learning course. *Please indicate your level of agreement with each of the statements below.*

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The community participation aspect of this course helped me to see how the subject matter I learned can be used in everyday life.	1	2	3	4	5
The community work I did through this course helped me to better understand the lectures and readings in this course.	1	2	3	4	5
I feel I would have learned more from this course if more time were spent in the classroom instead of doing community work.	1	2	3	4	5
I would have preferred spending more time in the community.	1	2	3	4	5
The idea of combining work in the community with university coursework should be practiced in more classes at this university.	1	2	3	4	5

YOUR EXPERIENCE OF THE COURSE

8.A We would also like to get your views on the course you attended. *Please indicate your level of agreement with each of the statements below.*

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This service- learning course took more of my time than other courses	1	2	3	4	5
Travel arrangements to the community were well-organised	1	2	3	4	5
The service-learning course cost me more money than other courses	1	2	3	4	5
The service learning course required much more work than other courses	1	2	3	4	5
I was well-prepared by the lecturer/s for my work in the community	1	2	3	4	5
The assessment methods used by the lecturer are appropriate for the course	1	2	3	4	5

YOUR SPECIFIC COMMENTS ON THE OSDE ASSESSMENT METHOD

8.B The next set of questions solicit your opinion about OSDE (Objective Structured Dispensing Examinations) method that was used to assess your performance in this course. The OSDE aimed to evaluate your competence in the following skills / activities:

A. Preparing for dispensing
B. Establishing contact with patient/caregiver
C. Dispensing: giving information, instruction, warnings & cautions
D. Communication style

(*Please tick the most applicable answer*)

		Yes	No	Sometimes
1	Were you clear about the assessment procedure used in your OSDE?			
2	Did you find the OSDE assessment of your performance to be fair?			
3	Did you check the content of your OSDE sheet and the criteria list before doing any of the assessments during visits which were termed:			
	a) Practice			
	b) Test			
	c) Final			
4	Did you receive your OSDE results timeously to review your performance?			
5	Were the OSDE sheets you had different from each other with regard to:			
	a) The content			
	b) Scores for individual items			
	c) Sheet headings			

6. If you answered "yes "to any section of question 5 above, what changes occurred on the OSDE sheet:

a) **Content**

……
……

b) **Scores for individual items**

……
……..

c) **Sheet headings**

……
……..

7. Of sections A,B,C & D listed above, which one (s) was/ were most difficult for you to perform well.

……

8. Do you have any suggestions that might improve implementation of the OSDE assessment.

……

……

YOUR VIEWS ON COMMUNITY INVOLVEMENT?

9. The next set of questions relates to your attitudes toward community involvement. *Please indicate your level of agreement with each statement.*

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The community participation aspect of this course showed me how I can become more involved in a community.	1	2	3	4	5
I feel that the community work I did through this course benefited the community.	1	2	3	4	5
I probably won't volunteer or participate in the community after this course.	1	2	3	4	5
The community where I worked appreciated the involvement of university students in their community	1	2	3	4	5

10. We would also like to know how your involvement in the community may influence your choice of major and future profession. *Please indicate your level of agreement with each statement.*

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Doing work in the community helped me to define my personal strengths and weaknesses.	1	2	3	4	5
Performing work in the community helped me clarify which major I will pursue.	1	2	3	4	5
The community work in this course assisted me in defining which profession or career I want to pursue.	1	2	3	4	5
The work I accomplished in this course has made me more marketable in my chosen profession when I graduate.	1	2	3	4	5

11. Please indicate to what extent you agree or disagree with each of the following more general statements:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
It is important to me to find a career that provides the opportunity to be helpful to others or useful to society	1	2	3	4	5
People ought to help those in need as a "payback" for their own opportunities, fortunes and successes	1	2	3	4	5
I feel that I can make a difference in the world	1	2	3	4	5
Students ought to become involved in programmes aimed at improving communities	1	2	3	4	5
Having some impact on the world is within the reach of most people	1	2	3	4	5

PERSONAL EXPERIENCE

12. Finally, we would like some of your personal reflections on this experience

Please indicate to what extent you agree or disagree with each statement.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Most people can make a difference in their community.	1	2	3	4	5
I developed a better relationship with the lecturer in my course because of the community work we performed.	1	2	3	4	5
I benefited by working with members of a community from a cultural and language background other than my own.	1	2	3	4	5
The community work involved in this course a made me aware of some of my own stereotypes and prejudices	1	2	3	4	5
The work I performed in this course helped me learn how to plan and complete a project.	1	2	3	4	5
Participating in the community helped me improve my leadership skills.	1	2	3	4	5
I would support the view that all university courses at this level should involve a community component	1	2	3	4	5
I can make a difference in my community	1	2	3	4	5
The work I performed in the community enhanced my ability to communicate my ideas in a real world context.	1	2	3	4	5

Finally, please add any other comments you have about courses where learning takes place in a community setting.

……

……..

……

……..

Thank you for your insights regarding community-based learning!

APPENDIX II: MODIFIED SERVICE PROVIDER QUESTIONNAIRE

CHESP – SERVICE PROVIDER QUESTIONNAIRE[2]

We would like to better understand the impact that community-based learning has on our service provider partners. Please assist us by taking 5-10 minutes to complete this survey.

I. First we would like some information about you.

1. Official name of your organization

……
…….

2. How long have you been working with our university?

……..(years)

3. What type of organization are you?

Public sector organization	1
Private company (for profit)	2
Private company (non-profit)	3
NGO (non-profit)	4
Other (specify)	5

4. How long have you been in existence?

…….. (years)

5. What are the main areas addressed by your organization? (encircle all appropriate)

Education	1
Housing	2
Safety	3
Health	4
Environment	5
Public Service	6
Other (specify)	7

[2] Adapted from Gelmon et al (2001) *Assessing service-learning and civic engagement*. Campus Compact.

II. The next set of questions relates to your most recent experiences with the university.

6. Indicate the extent to which your interactions with the university have influenced your ability to fulfill the mission of your organization?

	To a large extent	To some extent	Very little extent	Not at all
New insights about the organization/its operation	1	2	3	4
Changes in organizational direction and objectives	1	2	3	4
Increase in number of clients served	1	2	3	4
Increases in number of services offered	1	2	3	4
Enhanced offerings of services	1	2	3	4
Increased leverage of financial/other resources	1	2	3	4
New connections/networks with other community groups	1	2	3	4
Other influences (specify)	1	2	3	4

7. A Indicate to what extent you have encountered the following problems or challenges? *Encircle all the responses that apply.*

	To a large extent	To some extent	Very little extent	Not at all
Increased demands upon staff time	1	2	3	4
Mismatch between course goals and organization	1	2	3	4
Project time period insufficient	1	2	3	4
Little contact/interaction with faculty	1	2	3	4
Students not well prepared	1	2	3	4
Students performed as expected	1	2	3	4
Number of students inappropriate for size of organization	1	2	3	4
Other (please specify)	1	2	3	4

7.B In this programme you were required to assist in the assessment of student performance using the OSDE (Objective Structured Dispensing

Examination) method. In these OSDEs, student competence using the following skills / activities was assessed:

A. Preparing for dispensing
B. Establishing contact with patient/caregiver
C. Dispensing: giving information, instructions, warnings & cautions
D. Communication style

	Yes	No	Sometimes
1) Did implementation of the OSDE affect your routine performance at the community health centre?			
2) Did you find conducting the OSDE (i.e. scoring it) easy?			
3) When conducting the OSDE assessment did you offer assistance to the student in any way?			

(Please tick the most applicable answer)

4) Which of the above-mentioned OSDE parameter (s) (skills / activities) did you find difficult to assess?

A. Preparing for dispensing ☐
B. Establishing contact with patient/caregiver ☐
C. Dispensing: giving information, instructions, warnings & cautions ☐
D. Communication style ☐

5) What suggestions would you like to make to improve implementation of the OSDE?

……
……

……
……

……
……

……
……

8. What were some of the economic effects of your work with the university? *Please indicate the extent of the effects in each case.*

	To a large extent	To some extent	Very little extent	Not at all
Increased value of services	1	2	3	4
New products, services, materials generated	1	2	3	4
Increased organizational resources	1	2	3	4
Increased funding opportunities	1	2	3	4
More effective completion of projects	1	2	3	4
Identification of new staff	1	2	3	4
Improved access to university technology and resources	1	2	3	4
Identification of additional volunteers expertise	1	2	3	4

9. In what ways do you believe that you are able to influence the university as a result of your connection with one of its courses? *Please indicate the extent of the influence in each case.*

	To a large extent	To some extent	Very little extent	Not at all
Influence on course content	1	2	3	4
Influence on faculty awareness of community	1	2	3	4
Influence on university policies	1	2	3	4
Influence on student learning experience	1	2	3	4
Other (please specify)	1	2	3	4

10. Do you plan to continue working with the university in this or another activity?

10. Do you plan to continue working with the university in this or another activity?

Yes	1
No	2
Don't know	3

11. As a result of your connection to this university course, how has your awareness of the university changed? *Please indicate the extent of the change.*

	To a large extent	To some extent	Very little extent	Not at all
I learned more about university programmes and services	1	2	3	4
I know whom to call upon for information and assistance	1	2	3	4
I am more involved with activities on campus	1	2	3	4
I have an increased knowledge of university resources	1	2	3	4
I have more interactions with faculty and administrators	1	2	3	4
I have taken or plan to take classes at the university	1	2	3	4
Other (please specify)	1	2	3	4

12. Please rate your level of satisfaction with your connection to a university course in the following areas.

	Very satisfied	Satisfied	Not satisfied	Very dissatisfied
Level and quality of interaction with students/faculty.	1	2	3	4
Quality of student work.	1	2	3	4
Feedback and input into planning of experiences.	1	2	3	4
Scope and timing of activity.	1	2	3	4
Level of trust with faculty and students.	1	2	3	4

13. How did you handle the logistics of your community-based learning course? *Please mark the one most accurate response.*

I made the arrangements and placements.	1
The faculty member made the arrangements and placements.	2
A graduate student made the arrangements and placements.	3
We handled the arrangements and placements collaboratively.	4
Students handled their own placements.	5

14. What was the best aspect of this experience for you?

……

……..

……

……..

……

……..

15. What aspects of the experience would you change?

……

……..

……

……..

……

……..

……

……..

16. Please add any other additional comments.

……
……..

……
……..

Thank you for your comments.

APPENDIX III: PHARMACOTHERAPY COURSE OUTLINE
2003 COURSE OUTLINE AND INFORMATION BROCHURE
PHARMACOLOGY 422

This is essentially a course in applied pharmacology and consists of 2 modules

MODULE A: CLINICAL BLOCK (coordinator: Prof P Mugabo)

Objectives (see handout from Prof Mugabo for revised objectives): To allow students

- To see " drug effects" in patients: i.e. to get experience on
  - The manifestations of drug effects in patients
  - How to measure and record the effect
  - Importance and relevance of the effect in specific situations
  - Reporting of the findings

- To gain experience / familiarity with therapeutic plans
  - To know the theoretical aspects of therapeutic plans
  - To identify the therapeutic plans for at least 4 patients
  - To critically assess the therapeutic plans of at least 4 patients
  - To report on acquired experience in doing the above.

- To gain experience in counseling patients on medicine use and afford opportunity for them to communicate with patients

- To interact with other health professionals (doctors, nurses, physiotherapists, etc)

- To develop competence in the assessment of prescriptions – i.e. look at scripts and analyze them)
- [To gain experience in either
  - Evidence-based medicine use by reviewing and reporting on clinical trail data of a selected drug **OR**
  - Dosage regimen calculation and therapeutic drug level monitoring **OR**
  - Development of treatment guidelines and Drug Formularies??]

- To document their training experiences in a portfolio

Mode of Delivery:

1. Introductory and invited lectures
2. Clinical site visits (incl. ward rounds, interactions with patients, staff, etc)
3. Seminar presentations

Assessments: See handout supplied by Prof. P. Mugabo.

MODULE B: PROBLEM-BASED LEARNING AND PRACTICAL TRAINING IN PHARMACOTHERAPY (CHESP project: **Skills Development for implementation of Rational Pharmacotherapy**; coordinator: Prof J Syce)

Objectives: To allow **students** to gain / develop

- Skill in problem-based learning (PBL) techniques
- Understanding of the theoretical principles of and practical skills in rational drug therapy
- Understanding of the P(ersonal)- Drug and P-treatment concept (& selection of drugs)
- Experience in dispensing medicines, with focus on the application of pharmacology in the practice of pharmacy in community and hospital settings.
- To develop competence in the assessment of prescriptions (do this in clinical block?)
- Experience in counseling and educating patients on medicine use
- Familiarity with patient needs, primary health care issues and procedures in the day hospital system with special emphasis on issues related to the pharmaceutical services
- Experience in the provision pharmaceutical services at community day hospitals
- Skills for life-long learning / continuous professional development
- [Understanding of procedures that might be used to measure pharmaceutical service quality or patient satisfaction]

To allow day hospital **pharmacists to gain/develop**

- Skill in PBL techniques and skill as facilitators (tutors) for training students & pharmacy personnel using PBL techniques.
- Understanding of the theoretical principles of and practical skills in rational drug therapy
- Understanding of the P(ersonal)- Drug and P-treatment concept (& selection of drugs)

- Experience in training students in dispensing (i.e. mainly the assessment of prescriptions, counseling patients on medicine use)
- Experience in assessment of students (pharmacy personnel) in training.
- [Skill in assessing/identifying problems w.r.t. pharmaceutical service delivery at practice sites]
- [Skill in identifying patient-specific problems (esp. related to phamacotherapy i.e. drug treatment of disease) associated with pharmaceutical service delivery at practice sites]
- [Understanding of essential drugs lists and treatment guidelines]

To allow day hospital **services or patients** at day hospitals

- Improve the level of patient education w.r.t medicine use
  - E.g. pamphlets from Pharmacy practice
  - Special presentations by students.
- Improve the provision of pharmaceutical services (speed up dispensing time, increased individual attention to specific patients, ??? How to assess?)
- To document levels of patient satisfaction and identify patient concerns w.r.t. pharmaceutical service provision (emphasis on pharmacotherapy ????)
- ???

How Delivered:

FOR STUDENTS

I. **PBL Sessions on campus** – first term

- Orientation lecture – week 1; by J Syce, all staff and students present

(see note 02chespnote 2)

- Facilitated sessions
  i. Groups of students with one facilitator
  ii. Objectives – to PBL
    1. Theory of rational drug therapy
    2. P-drug concept (➔ selection of drugs)
    3. Practice in implementation of drug therapy
    4. Practice in assessment i.e. one OSCE mark
    5. Preparation of P-formulary (i.e. P-form mark)

(Focus on one disease only; have P- formulary for that one disease; make sure that P-drug concept is well applied; only give cases right at the end; (subdivide group into smaller number of diseases so that more states can be covered? Is this feasible or is time too little?)

iii. Assessments during PBL sessions on campus

1. Participation in sessions (groups marks and facilitator marks; emphasis assessment of PBL skills) 10%
2. One OSCE mark for one random case on the disease 10%
3. P-Formulary for that disease 10%

I. **Hospital site visits**

Each visit will be for 3 hr session (e.g. 08:30 – 11:30) and the visits will be divided into 3 blocks.

Visits 1 & 2: Orientation Phase

- Orientation to the facility and its services, esp. the pharmaceutical services
- Orientation to application of rational pharmacotherapy in patients (observe how pharmacists dispenses, drugs used, diseases seen, treatment guidelines if they are available, etc).
- Write site activity reports for each week (noting drugs & diseases encountered); to be handed in every week, student to keep copy; monitor for progress). **10%**

In between visits

- Learn treatment guidelines for diseases prevalent at the site
- Review pharmacology of drugs used at the site (eg directions for use, adverse effects; special advice needed by patients, etc
- Prepare notes (formulary), educational materials, project proposal
- (Discuss your project proposal with facilitator before your next stint at the site)
- Prepare strategies for interaction with patient other health personnel
- Start portfolio

Visits 3–9: Skills learning & Practice Phase

- Practice and assessment in application of pharmacotherapy (dispensing)
- OSCE's (practice and assessment) (by facilitator & peers; average of at least 4 single OSCE marks **10%**
- Practice patient counseling (while dispensing i.e. short times or during longer individual interviews/counseling for individual patients who have problems; or per request from other personnel e.g. correct use of MDI's, etc.)
- Data collection and implementation of (patient education or service related) project
- Weekly activity reports (copy to be retained by facilitator; latter monitor progress) **10%**

In between visits

- Learn/review treatment guidelines for diseases prevalent at the site
- Learn/review/update pharmacology of additional drugs used at the site (e.g. directions for use, adverse effects; special advice needed by patients, etc
- Update notes (formulary), educational materials, project proposal & analyze data, start write up of project report
- Continue with portfolio

Visit 10: Evaluation Phase

- Final implementation and assessment of skill in pharmacotherapy (dispensing)

OSCE's (assessment) (by facilitator & peers; a continuous battery of 4 to 6 cases **20%**

- Complete data collection and implementation of (patient education or service related) project. The Final Report to be handed in by **20 October 2003. 10%**

- Weekly activity report (copy to be retained by facilitator; latter monitor progress) **10%**

Assessments during Hospital visits (total: 70%):

a. OSCEs (second visit and finals 10 + 20 = 30 %) 30%

b. Portfolio on PBL- Pharmacotherapy experiences (incl P –formulary, treatment guidelines, etc) 10%

c. Project (report and implementation) 10%

d. Weekly activity reports 10%

e. Overall Development/ Progress assessment by facilitator 10%

NOTE: OSCES could be recorded on videotape

FINAL MARK: PBL sessions on campus 30%

Assessment during Hospital visits 70%

FOR PARTICIPATING PHARMACISTS AT PRACTICE SITES.

The provisional programme contemplated for the pharmacists is also divided in 2.

1. Training in PBL Pharmacotherapy

First term. (This will occur in the first term in the 2003 programme).

Course contents.

1. PBL Techniques
2. Principles and Application of Rational Pharmacotherapy

a. Based on WHO Manual

b. Rational Pharmacotherapy
c. P-drug concept

3. Review of treatment guidelines of disease states prominent at practice sites
4. Assessment of pharmacotherapy skills of students

a. General Principles in assessments

b. OSCE's and OSCE score sheets
c. Practice in scoring students

5. Others - Identification of Patient needs? Issues of pharmaceutical Service provision??, Treatment Guidelines, Essential Drugs lists??

The training will be done during 4 x 2 hr sessions (afternoon 14:00 – 16:00) to be held at the School of Pharmacy, UWC campus. The first 2 sessions will be held on 2 consecutive afternoons, (now anticipated to start during last week of May 2003 or last week in July). Then there will be a 2-week break and the last 2 sessions will be held in week thereafter). These sessions will be facilitated by School of Pharmacy staff and PG students and will involve problem-base learning and (eventually in following years) computer-based learning materials.

2. Interaction with Students

Second to 4th term: Supervision/facilitation of learning by Students during site visits.

The student visits will occur in 3 blocks and during these visits the pharmacists will be required to:

Visit 1& 2 Orientation Phase

- Orientate students to facility, show them what to do (possible emphasis on value-added activities; must involve pharmacology / pharmacotherapy), expose them to the drugs encountered at the site, can give them assignments related to pharmacology & or identify potential projects for students, introduce them to Standard Operating procedures (SOP) for dispensing at the site)
- Assess weekly reports of the students (or pass it onto facilitator or pass it on to campus coordinator).

Visit 3- 9 Skills learning & Practice Phase

- Continue training/supervision of students who must apply rational pharmacotherapy techniques in their dispensing, supervise students assessment of prescriptions, expose them to the drugs encountered at the site, can give them assignments related to pharmacology/identify potential projects for students)

- Effectively use students perform dispensing at site or to address particular problems e.g. addressing individual patient requests, etc
- Conduct/Facilitate OSCE's - 4 marks / cases for each student per rotation (student should inform facilitator of their need to do OSCE, facilitator selects the patient/folder)
- Supervise/guide students with implementation of their project
- Assess weekly reports of the students; pass it on to campus coordinator

Visit 10 Evaluation Phase

- Conduct final OSCEs - battery of 4 to six cases in a row

- Assess implementation of student project
- Provide final progress mark (professional competence mark) for each student

Provide feedback on programme

Note: 1. It is hoped that this programme for pharmacists would eventually be registered as a Continuing Education or DLL course. The course will thus comprise

(i) Theory/lectures/PBL sessions in first term

ii. Practical: Interaction with students (i.e. facilitation of student learning); practice related project on pharmacotherapy

iii. Assessment: Continuous throughout programme and final assessment

UWC School of Pharmacy to issue certificate; fees?

Note: 2. Staff and PG students of the School of Pharmacy will facilitate the pharmacists' training.

Note 3. UWC might consider assisting in training of assistants later, but that is not presently part of the programme

FOR SERVICE PROVIDER/PATIENT COMMUNITY

??? - this will be focused on next year.

RESEARCH ASPECTS.

For 2003,

1. Project on use of OSDE to assess learning and competence in Implementation of Rational Pharmacotherapy. – M Pharm project
2. Perceptions of Pharmacists and patients - student projects

Provisional schedule of Hospital visits for PBL

2003 PBL - Pharmacy Visits will start in second term (week of 22 April 2003) with more than one visit per week to complete the visits. 2003 Sites are (decided not to use Bellville CHC):

PBL Site 1 = Bishop Lavis Community Health Center

PBL Site 2 = Delft " " "

PBL Site 4 = Vanguard " " "

PBL Site 5 = Dr Abdurahman " " "

Revised/Provisional schedule of Hospital visits for PBL

From 13 May 2003 till 21 October 2003.

Study period 8 – 13 November; Final Exams start 13 November

UNIVERSITY OF THE WESTERN CAPE

SCHOOL OF PHARMACY, DISCIPLINE OF PHARMACOLOGY

SKILLS DEVELOPMENT IN RATIONAL PHARMACOTHERAPY

2003 PROGRESS TEST # 3

Date: 29 August 2003 **Time: 20 mins**

SECTION A (closed book)

Time: 20 **Marks:30**

NUMB

Instructions:

1. **This is a CLOSED BOOK part of the exam to be completed first.**
2. **Answer all questions on the sheet and hand in sheet.**
3. **For each of the questions select the one most appropriate answer from the list of options provided and indicate your choice by circling the letter next to your selected option.**

QUESTION

1. For which drug would the following directions most likely apply:

"Take one tablet on Monday, Wednesday and Friday"

A. Hydrochlorothiazide (Ridaq^{R}) 25 mg tablet
B. Prempak^{R} 125 mg tablet
C. Minipress (Prazosin^{R}) 5 mg tablet
D. Orphenadrine 50 mg
E. Lasix ^{R} (Furosemide) 40 mg tablet

2. When providing instructions about the use of beclometasone (Beclate® nasal spray you may mention the following EXCEPT:

1. Shake the dispenser to mix the drug and the propellant
2. Spray one puff into each nostril
3. An immediate effect/ relief will be obtained
4. Sneezing may occur with initial dose(s)
5. Keep the nozzle clean at all times

3. **Which hormone replacement therapy would be most suitable for a patient who has undergone a hysterectomy**?

   A. Premarin 0.625mg
   C. Predisone

   B. Prempak® 1.25mg
   D. Phenytoin

4. **Which of the following dosage regimens of Adco-Atenolol ® 50mg tablets is most appropriate, effective and convenient for an adult suffering from angina pectoris.**

   A. One tablet twice a day
   D. Two tablets three times a day

   B. Two tablets once a day
   E. One tablet once a day

   C. Two tablets twice a day

5. **Which statement about orphenarine is INCORRECT**
   1. It is a antihistamine
   2. It is prescribed concurrently in the treatment of Parkinsonism because it has prominent anti-cholinergic
   3. properties that are used to control extra-pyramidal side-effects induced by drug therapy.
   4. It is most useful in young patients
   5. It can cause sedation if taken concurrently with alcohol

6. **For the following tablets choose the most appropriate additional directions**

   (A,B or C) from the list.

   A = to be taken at night

   B = to be taken with meals

   C = to be taken in the morning

   - **Trepiline® 25mg tablet once daily**
   - **Prempak® 0,625mg tablet once daily**
   - **Epanutin® capsules 300mg once daily**
   - **Reserpine 0,25mg once daily**
   - **Promethazine 25mg once daily**
   - **Indocid® 25mg capsules once daily**

7. **The recommended dose of mebendazole (D-Worm®) for a 6 year old is:**

   A. 500mg po *stat*
   C. 100mg po *stat*

B. 100mg po *bd* for 2 days D. 100mg po *bd* for 3 days

Choose the MOST appropriate direction for using Elantan ®(isosorbide-5- mononitrate) for the treatment of angina pectoris.

1. One 20mg tablet under the tongue when needed
2. One 20mg tablet once in the moring
3. One 20mg tablet twice a day
4. One 20mg tablet 2-3 times daily
5.

8. Which of the following medicines is absolutely contra-indicated in an

A. Theodur® C. Elantan® E. Zyrtec®

B. Fungizone® D. Adco-Atenolol®

9. When must the first initial dose of 0.5mg prazocin tablet be taken:

A. At bedtime or in the evening C. In the afternoon

B. In the morning

10. For which drug will the following directions most likely apply?

"*Take one tablet on Monday ,Wednesday and Friday"*

A. HCTZ (Ridaq®) 25mg tablets D. Inza® 200mg tablets

- **Reserpine 0,25mg once daily**
- **Promethazine 25mg once daily**
- **Indocid® 25mg capsules once daily**

11. The recommended dose of mebendazole (D-Worm®) for a 6 year old is:

A. 500mg po *stat* C. 100mg po *stat*

B. 100mg po *bd* for 2 days D. 100mg po *bd* for 3 days

Choose the MOST appropriate direction for using Elantan ®(isosorbide-5- mononitrate) for the treatment of angina pectoris.

1. One 20mg tablet under the tongue when needed
2. One 20mg tablet once in the moring
3. One 20mg tablet twice a day
4. One 20mg tablet 2-3 times daily
5.

12. Which of the following medicines is absolutely contra-indicated in an

A. Theodur® C. Elantan® E. Zyrtec®

B. Fungizone® D. Adco-Atenolol®

13. When must the first initial dose of 0.5mg prazocin tablet be taken:

A. At bedtime or in the evening C. In the afternoon

B. In the morning

14. For which drug will the following directions most likely apply?

"*Take one tablet on Monday ,Wednesday and Friday"*

A. HCTZ (Ridaq®) 25mg tablets D. Inza® 200mg tablets

B. Epanutin® 100mg tablets E Warfain 5mg tablets

C. Prempak® 0,625µ g

APPENDIX V: VISIT SCHEDULE OF GROUPS 1 - 14

Group Visit schedule

2003 TERM 2

DAY	DATE	Bishop Lavis	Delft	Vanguard	Kewtown
TUE	13 MAY	13	12	10	11
WED	14 MAY	8	14	9	7
THUR	15 MAY	5	6	1	2
TUE	20 MAY	MIC*	MIC*	MIC*	MIC*
WED	22 MAY	MIC*	MIC*	MIC*	MIC*m
THUR	22 MAY	13	3	10	4
TUE	27 MAY	13	14	10	11
WED	28 MAY	5	12	1	2
THUR	29 MAY	8	3	9	7
TUE	03 JUN	X	X	X	X
WED	04 JUN	X	X	X	X
THUR	05 JUN	X	X	X	X

Key: Site BL= Bishop Lavis CHC, Lavis Drive, Bishop Lavis, 934 6050

Site D = Delft CHC, Main Rd, Voorbrug, 954 2235.

Site V = Vanguard CHC, Candlewood Rd, Bonteheuwel, 694 5540

Site Q = Dr Abdurahman CHC, Ebbehout Street, Kewtown. 637 9071.

*** MIC denotes visits to the medicine information center**

*** X = denotes no visits to sites**

Group Visit schedule

2003 TERM 3

DAY	DATE	Bishop Lavis	Delft	Vanguard	Kewtown
TUE	22 JUL	8	14	10	11
WED	23 JUL	5	3	9	4
THUR	24 JUL	13	6	1	2
TUE	29 JUL	5	12	1	4
WED	30 JUL	13	6	10	7
THUR	31 JUL	8	14	9	11
TUE	05 AUG	5	3	1	2
WED	06 AUG	8	6	9	11
THUR	07 AUG	13	12	10	4
TUE	12 AUG	13	12	1	4
WED	13 AUG	5	14	9	2
THUR	14 AUG	8	3	10	7
TUE	19 AUG	X	X	X	X
WED	20 AUG	X	X	X	X
THUR	21 AUG	X	X	X	X
TUE	26 AUG	8	6	9	7
WED	27 AUG	13	12	10	11
THUR	28 AUG	5	14	1	2
TUE	02 SEPT	5	3	1	2
WED	03 SEPT	8	6	10	4
THUR	04 SEPT	13	12	9	11
TUE	09 SEPT	8	6	9	7
WED	10 SEPT	13	3	1	2
THUR	11 SEPT	5	14	10	4

2003 TERM 4

DAY	DATE	Bishop Lavis	Delft	Vanguard	Kewtown
TUE	23 SEPT	5	6	9	7
WED	HOLIDAY	XXXXXXXX	XXXXXXXX	XXXXXXXXX	XXXXXXXXX
THUR	25 SEPT	8	12	1	11
TUE	30 SEPT		14		4
WED	01 OCT		3		2
THUR	02 OCT		12		7
TUE	07 OCT		3		11
WED	08 OCT		6		7
THUR	09 OCT		14		2
TUE	14 OCT		14		7
WED	15 OCT		12		11
THUR	16 OCT		6		4
TUE	21 OCT		3		4
WED	22 OCT				
THUR	23 OCT				
TUE	28 OCT	UPD	UPD	UPD	UPD
WED	29 OCT	x			
THUR	30 OCT	X			
TUE	04 NOV	X			
WED	05 NOV	X			
THUR	06 NOV	X			

APPENDIX VI: TIMETABLE OF OSDE TEST DATES

Timetable for Dates for OSDEs' Test					
Vanguard C.H.C					
OSDE test dates					
Group	**Type of OSDE used by group**	**3rd week**	**7th week**	**9th week**	**10th week**
1		**24July**	**28 Aug**	**10 Sept**	**25 Sept**
2 students	**OSDE**				
10	**OSDESP**	**24Jul**	**14 Aug**	**3 Sept**	**11 Sept**
3 students		**OSDE**	**OSDSP1**	**OSDSP2**	**OSDE**
9	**OSDEF**	**23 Jul**	**26 Aug**	**9 Sept**	**23 Sept**
3 students		**OSDE**	**OSDEF**	**OSDEF**	**OSDE**
Delft C.H.C.					
3	**OSDE**	**23 July**	**2 Sept**	**7 Oct**	**21 Oct**
3 students					
6	**OSDEF**	**30 July**	**9 Sept**	**8 Oct**	**16 Oct**
3 students		**OSDE**	**OSDEF**	**OSDF**	**OSDE**
12	**OSDESP**	**29 July**	**4 Sept**	**2 Oct**	**15 Oct**
3 student		**OSDE**	**OSDSP1**	**OSDSP2**	**OSDE**
14	**OSDESP**	**22 July**	**11 Sep**	**9 Oct**	**14 Oct**
		OSDE	**OSDSP1**	**OSDSP2**	**OSDE**

OSDE = generic OSDE
OSDEF = generic OSDE with feedback
OSDESP = Special OSDE

Timetable for dates for OSDEs’					
Bishop Lavis C.H.C					
OSDE test dates					
Group	**Type of OSDE used by group**	**3rd week**	**7th week**	**9th week**	**10th week**
5		**23July**	**28 Aug**	**11 Sept**	**23 Sept**
3 students	**OSDE**				
8	**OSDEF**	**22Jul**	**26 Aug**	**9 Sept**	**25 Sept**
3 students		**OSDE**	**OSDEF**	**OSDEF**	**OSDE**
13	**OSDESP**	**23 Jul**	**12 Aug**	**27 Sept**	**10 Sept**
3 students		**OSDE**	**OSDSP1**	**OSDSP2**	**OSDE**
Dr Abdurahman C.H.C.					
2	**OSDE**	**24 July**	**3 Sept**	**25 Sept**	**1 Oct**
3 students					
7	**OSDEF**	**30 July**	**23 Sept**	**8 Oct**	**15 Oct**
3 students		**OSDE**	**OSDEF**	**OSDF**	**OSDE**
11	**OSDESP**	**23 July**	**4 Sept**	**7 Oct**	**14 Oct**
3 student		**OSDE**	**OSDSP1**	**OSDSP2**	**OSDE**

OSDE = generic OSDE
OSDEF = generic OSDE with feedback
OSDESP = Special OSDE

APPENDIX VII: CRITERIA SHEET USED BY INDEPENDENT ASSESSOR

03CHESP Independ ODSE Score sheet 01

A. Student details

Student Name: _____ Student Number: _____

Group Number:_____ CHC: _____

INSTRUCTIONS

Please assess each student's dispensing skill w.r.t to the items (i) to (iv) by listening and watching the video recording and ticking off in column when and if each of the requirements for each drug in the prescription is seen or heard to occur.

B. Details of prescription

# of items _____

medical condition(s) being treated _____

C. Assessment of items

(1) **NAME OF DRUG**

Drug Number	Trade	Generic	Strength	Pharmacological class	Dosage form
1					
2					
3					
4					
5					
6					

(ii) DRUG EFFECTS

Drug Number	**Pharmacological group**	**Effect of drug**	**MoA (where it works?)**	**MoA (how it works?)**
Example 1	antihypertensive	↓ BP	Works on your kidneys	You will urinate frequently
1				
2				
3				
4				
5				
6				

(iii) INSTRUCTIONS FOR USE

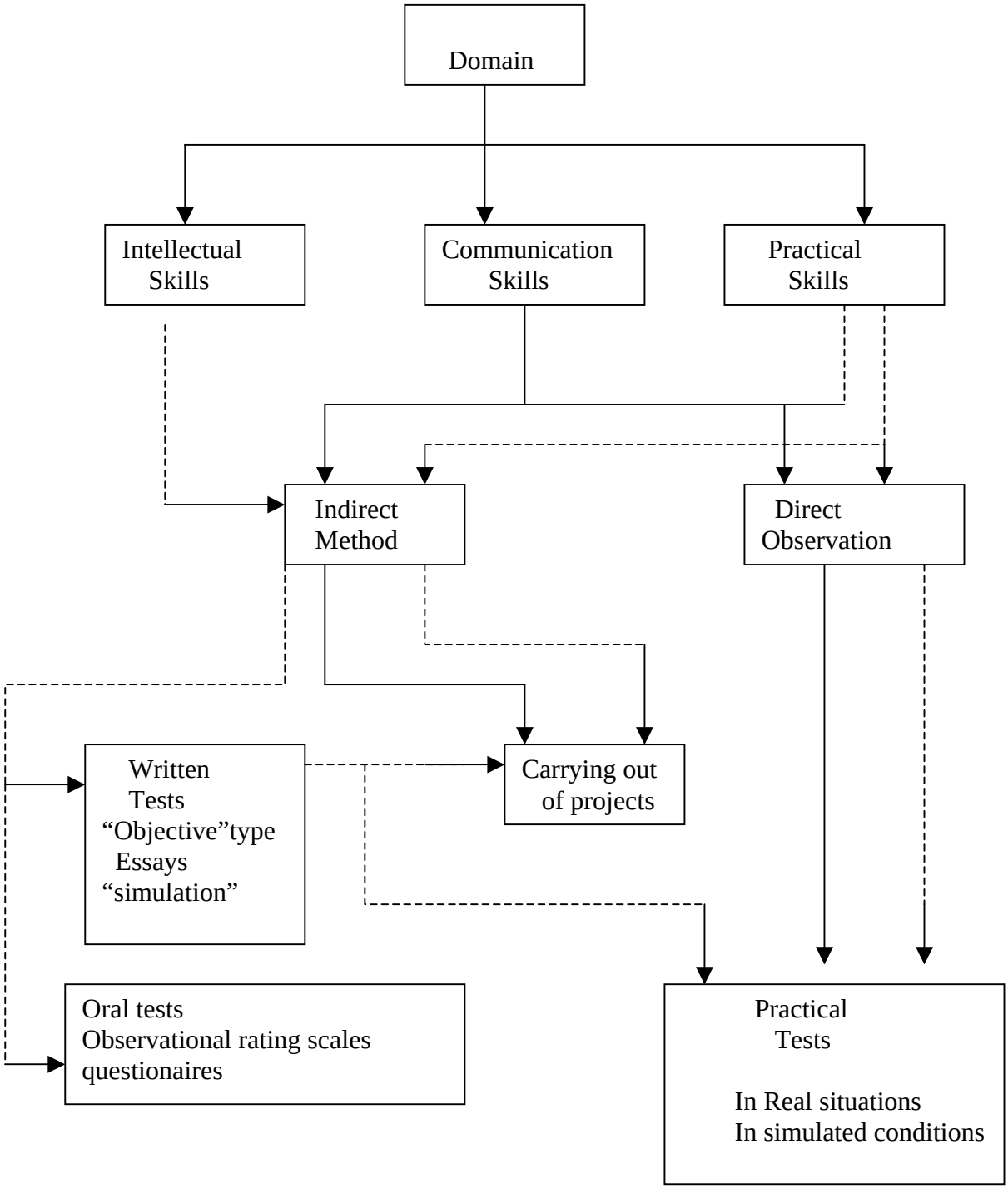
Drug Number	**Amount**	**Frequency/ When**	**Route of administration**	**Duration / special instructions**	**Taken with / after food**
1					
2					
3					
4					
5					
6					

(iv) ADVERSE EFFECTS/ CAUTIONS WARNINGS, ETC

Drug number	ITEM	**ADVERSE EFFECTS**	**WARNINGS**	**DRUG INTERACTIONS**	**CAUTIONS**
1					
2					
3					
4					
5					
6					

APPENDIX VIII: FIGURE INDICATING THE DOMAINS TO BE EVALUATED

EVALUATION METHODOLOGY TO DOMAINS TO BE EVALUATED



CURRICULUM VITAE

NAME:	Denise Eleanor Frieslaar
DATE OF BIRTH:	15 September 1960
ADDRESS:	6 Harmonie Road, Hazendal, 7764
TELEPHONE Number:	696-0513 (Home) 637-9071 (Work)
QUALIFICATIONS:	
Academic	Matriculated from South Peninsula High School
	Bachelor of Pharmacy (B.Pharm) U.W.C.1983 Registered as a part-time Master's student 2003

WORK EXPERIENCE:

1985 –1986	Manager: Crane Pharmacy, Kalk Bay
1987 – 1988	Pharmacist: Medi-Clinic, Mitchells Plein
1988 - 1989	Pharmacist : Barnett's Pharmacy Pinelands
1989 - 1990	Pharmacist : Community Health Organisation Currently Principal Pharmacist: Community Health Organisation

PAPERS DELIVERED:

The Development and evaluation of the OSDE for use in a pharmacy training programme.

Congress of the Academy of Pharmaceutical Sciences of S. A. at Rhodes University, Grahams town, (2004)

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