“Why do we not make the basic science experience more exciting, less rigid, and allow it to continue throughout the medical school?”

Clawson, (1990: 87)

Concerns regarding the curriculum at the medical school at UEM are accurately reflected in the above quotation. In the previous chapters a picture of the current situation at this school was presented. In this chapter the implications of the findings are discussed and some recommendations for further studies are made.
5.1 DISCUSSION

This study was carried out in an attempt to evaluate the effectiveness of the teaching-learning of Anatomy in promoting an understanding of what is experienced in clinical practice, and to contribute to adapting the medical curriculum to the present Mozambican conditions. This is important by virtue of the fact that it will help to ensure a better quality of medical professional, which is one of the goals of the process of curricular reform currently in progress in the Faculty of Medicine of UEM.

5.1.1 Research Design

The impact of teaching-learning Anatomy on the medical training/practice at the Faculty of Medicine in UEM was evaluated in this study by applying a cross-sectional quantitative and qualitative design using three different instruments (questionnaire, clinical reports and semi-structured interview).

Such combination of qualitative and quantitative data-gathering instruments is advantageous. The decision to use these different types of instruments for data collection was reinforced by reference to previous studies (Schumacher and McMillan, 1993 and Marel et al., 2000), where effective data collection was described by using these types of instruments. Lawrenz and McCreath (1988) state that “the qualitative components provide richness to the data and are a valuable source for identifying relevant variables. The quantitative components provide the “hard” data necessary to
document the degree of the effects”. Similarly, Miles and Huberman (1994) describe several reasons for combining qualitative and quantitative instruments:

1. The combination of instruments enables a confirmation or corroboration of each other via triangulation

2. It makes possible an elaboration or development of analysis, providing richer detail (results of the first method inform the second’s sampling)

3. Quantitative methods “persuade” the reader through de-emphasizing individual judgement and stressing generalisable results. On the other hand, qualitative research persuades through rich strategic comparisons across subjects, thereby overcoming abstraction inherent in quantitative studies.

4. During analysis, quantitative data can help by showing the generality of specific observations, and verifying or casting new light on qualitative findings. Looked at from the other side, qualitative data can help the quantitative side of a study during design by aiding the conceptual development of the researcher and instrumentation. During analysis they can help validating, interpreting, clarifying, and illustrating quantitative findings.

More specifically, quantitative instruments such as questionnaires have several disadvantages when used alone. With such instruments there is no opportunity for asking clarifying questions immediately after a particular response has been given. Particularly in the case of the clinical reports, such instruments are static and give no information about the stability and dynamics of participants’ conceptions. To compensate for these disadvantages, interviews were used. Therefore, all the instruments contribute in different ways to evaluating the participants’ perceptions on the impact of teaching-learning Anatomy on the medical training/practice at UEM.
As presented in Chapter 3 Section 3.2.1 page 70 the questionnaire used in this study was devised by the researcher but face validity of this content domain had been established since validity is the extent to which inferences made on the basis of scores from an instrument are appropriate, meaningful, and useful. In fact, validity is a judgement of the appropriateness of a measure for specific inferences or decisions that result from the scores that are generated. In other words, validity is a situation-specific concept: validity is dependent on the purpose, population, and environmental characteristics in which measurement takes place (Ebel & Frisbie, 1991). However, in general, it is important to keep in mind that research instruments, including tests and questionnaires, are valid for some groups and in some situations, and invalid for other subjects or in other situations. It has been argued that an inference is valid or invalid, not a test. A test by itself is not valid or invalid because it can be used for different purposes, (Ebel and Frisbie, 1991; Gronlund, 1993; Schumacher and McMillan, 1993).

Of the eligible participants, 95% filled in and returned the questionnaire. This return rate was viewed as excellent since it supports the value of the study and could be interpreted as a very good indication that this type of study is relevant to those involved. Indeed, to obtain deeper insights into the students’ conceptions of the usefulness of the process of teaching-learning Anatomy as part of the undergraduate training, only senior students and junior doctors working at the Department of Casualty and Emergency at the Central Hospital of Maputo City (HCM) were involved in the evaluation of the application of anatomical knowledge within the medical training.
Particular importance should be attached to the fact that for many years there was an unacceptably high failure rate in Anatomy that limited the progress of students in the medical course to around 20-30% (Rodrigues, 2000). Because of this, Anatomy was viewed as the critical and limiting course within the medical training programme at UEM and the staff of the Department of Anatomy as the worst group of lecturers.

The high response rate might also be explained by the interest of students and doctors in understanding in particular the difficulties inherent in the teaching-learning of Anatomy in order to improve not only the quality of doctors but also the number of graduates. In addition, the questionnaires were administered at a time when there was no major examination for those students immediately before or after the completion of the questionnaires. The anonymous nature of the questionnaires may also have contributed to this high return rate, although the anonymity lead to the need to use interval variables instead ordinal when evaluating performance in Anatomy and related courses. However, despite the fact that the level of ability to recall their own performance could have been affected by the time lag, this effect of using memory was similar for all the different courses. Thus, although it can be seen as a limitation in the accuracy of the responses, it did not affect the general analysis of relationships between the different medical courses.

The Cronbach’s Alpha Coefficient was used to evaluate the internal consistency of the items of the questionnaire and therefore run on all 50 items. The value of $\alpha = 0.90$, which is considered as good (Anastasi and Urbina, 1998) showed a high level of consistency. Similar consistency was found across the years of study both in the sub-scales as well as in the total scale. In scale construction internal consistency is a
desired quality, as all the items should contribute to the content domain being examined. There are several factors that should be considered in interpreting reliability coefficients: the more heterogeneous a group is on the trait that is measured, the higher the reliability. The more items there are in an instrument, the higher the reliability and the greater the range of scores, the higher the reliability. Thus, it is clear that these results showed that there was a good internal consistency, meaning that all the items contributed to the desired content domain and time did not affect this consistency.

To evaluate the doctors’ performance in applying anatomical knowledge in clinical practice, clinical reports of patients were used. As described in Chapter 3, Section 3.1.3, page 67, these clinical reports were randomly selected from the reports of patients seen by the participants in the study in the “Balcão III” room. This was an appropriate setting for investigation since the patients presenting to this room are all at an equivalent level of minor/superficial trauma requiring some skilled basic treatment (e.g. fractures, sutures) and appropriate investigations such as radiographs. It is a unique setting where only senior students and junior doctors work relatively independently.

The characteristics of the clinical report could have influenced the quality of data gathered since the report does not require an extensive record of the patient assessment. However, it is important to take into account that it is the official patient record and thus, it is the instrument which the doctor should use in this environment. This weakness of the instrument supports the need to interview some of the study’s participants in order to understand the discrepancies in reporting on the medical examination.
The number of reports differed between senior students and junior doctors since it was expected, and confirmed during the pilot and the main study, that the junior doctors would be more consistent in completing the clinical reports than students in their first year of doing this independently. Thus it was considered necessary to use two reports of each senior student and only one of each junior doctor.

It should be emphasized that despite the fact that participation in the study was on a voluntary basis, there were no senior students or junior doctors who could have been involved and who refused to participate. The importance of the study for this community appears to have been understood by the participants. Thus, the collection and analysis of the data were influenced by these considerations (Chapter 3, Section 3.2.1, page 70).

To compensate for the disadvantages associated with using questionnaires and clinical reports, (as described in Chapter 3, Section 3.1.3, page 67, after collecting the data from the clinical reports the two senior students and the junior doctor who produced the weakest clinical reports overall and the two senior students and the junior doctor who had produced the best clinical reports overall were interviewed in order to better understand or at least to identify the reasons for these performances. This decision is supported by the work of authors such as Ratnapalan & Hilliard (2002) who stated that an interview could be viewed as a conversation with the purpose of gaining in-depth insight into someone’s perspective. According to these authors, the advantages of any interview are that it is personal and gives the researcher in-depth understanding of the learner’s perspectives.
In medical education, interviews are useful as a needs assessment technique to understand a learner’s knowledge base and how this shapes their perception of educational needs. On the other hand, in the context of qualitative research, validity relates to determining the extent to which conclusions effectively represent empirical reality and assessing whether constructs devised by the researcher represent or measure the categories of human experience that occur (Schumacher & McMillan, 1993).

5.1.2 Findings

The study was centred on three key research questions which were answered by the application of the three instruments described.

5.1.2.1 Is the Anatomy course perceived by the students as structured to address their needs regarding medical practice?

The Medical Curriculum

In this study it was assumed that the medical curriculum is defined in terms of the intended aims and objectives, content, experiences, outcomes and processes of a medical programme which includes: a description of the training structure (length and organisation of the programme including its flexibilities, and assessment system), a description of the expected methods of teaching and learning, feedback and supervision and should cover both generic professional and specialty specific areas (Coles & Gale Grant, 1985). Indeed, several authors have described how the
curriculum exists at three levels: what is planned for the students, what is delivered to
the students, and what the students actually experience. It was in this context that the
aspects such as the content of the Anatomy course, the role of Anatomy in a medical
course, the methods of teaching-learning used in Anatomy and the learning outcomes
of the Anatomy course were explored to understand whether the students’ learning
experiences are aligned with their expectations for acquiring the necessary
competence for the practice of medicine.

The results of the questionnaire and the interviews are consistent in this regard. All
the sub-scales of the questionnaire produced values close to 4, indicating that most of
the participants agreed, but not at the stronger level of agreement, with the
statements. The comments of interviewees presented as representative quotes in
Chapter 4, Section 4.5, page 106, corroborate this weakly positive position. For
example Interviewee 2 said: “There is a lot of information in Anatomy which I did
not use in my practice while there is other information which I missed, without
understanding that it is necessary for medical practice. Thus, in my opinion it will be
necessary to review … the content of the Anatomy course…”. The overload of
anatomical information in the medical course was thus highlighted as well as the
impression that some of the anatomical content should be replaced.

Content overload

The content of medical curricula has received extensive coverage in the literature.
Vernon & Blake (1993) have pointed out that in the past the content of most
undergraduate medical courses has been largely determined by tradition or the views
of certain influential individuals or disciplines. In many instances the members of individual clinical subspecialties could define what students needed to learn in the basic sciences, often without reference to the actual cases in which the students would need to be competent by the time of graduation. These endeavours have resulted in excessive overloading of the curriculum with unnecessary detail and consequently the dependence upon sheer memory which tends to impact negatively on the process of learning (Bordage, 1987 and Worley, March & Worley, 2000)...

This almost universal tendency to overload medical curricula should be taken into account when interpreting the results of the present study, particularly those derived from the interviews. For example, one of the most frequent comments was that much of the repetition of the curricular content in the medical course at UEM is unnecessary, since the approaches are at same level of complexity and do not add any identifiable new knowledge nor help in adding to an understanding of the contents of that specific clinical subject. Such repeated material is seldom assessed and is thus seen by the students as irrelevant and a waste of time since it reduces the time available to devote to those areas that require more time and would contribute more beneficially to the students’ learning and competence.

Probably, this unnecessary repetition of information could be due to the fact that, since the introduction of the current curriculum in 1995, the views of the most influential disciplines, departments and individuals have periodically resulted in changes to the content and assessment procedures, without implementing any official review or reform process of the curriculum as a whole. These piecemeal and uncoordinated changes to the curriculum which took place without the proper
supervision of the legitimate academic authorities of the Faculty, could thus have expanded the total volume of information which the students are required to learn, but with questionable additional value for the clinical competency of the graduates.

Not only are many medical curricula overcrowded, but the nature and quality of the information presented has also been questioned. Many authors (for example Bordage, 1987; Clawson, 1990 and Worley, March & Worley, 2000) have criticised the undergraduate curriculum for being grossly overcrowded with factual information. There is broad acceptance that the sheer volume of information available to doctors and the rate of advancement within medical sciences make it impossible to teach medical students everything they need to know within a medical course (Heath & Beatty, 1998 and Whittle & Murdoch-Eaton, 2002). Moreover, as Clawson (1990) emphasized, much of the volume of factual information students are expected to master in the traditional basic science exposure will not be remembered beyond the final examination or used in practice.

Curriculum organisation

Information overload in the curriculum, as highlighted by Hyppölä et al. (2002), may be further exacerbated by the fact that many traditional curricula, as in the case at UEM (see Chapter 1, Section 1.3.1, page 4) are divided into preclinical and clinical phases, with limited integration between the two and with little relevance to the practical needs of the students at the different levels. This position was reinforced by Barrows (1991) who was one of the earliest proponents of integrated curricula and was jointly instrumental in the introduction of the PBL curriculum at MacMaster University. He
suggested that if students believe that basic sciences are merely a hurdle they need to clear for access to the clinical years, they are less likely to be able to apply basic science knowledge to the understanding and management of clinical cases.

It should however be noted that many problem-based and integrated curricula are still divided into two phases, with the emphasis on basic science in the first phase and on clinical medicine in the second. They usually differ from the traditional curricula in that there is a strong emphasis on linking and applying the basic science to the relevant clinical situations rather than learning it in isolation.

The picture of learning in a traditional discipline-based curriculum is an accurate description of the current situation at UEM. The implication is that if the curriculum can be altered so that the students can apply basic science knowledge to the diagnostic process more effectively, diagnostic skills may well be improved. However, the majority of the interviewees in the present study agreed that if it is true that there is a need to develop a better foundation for the clinical disciplines by starting earlier clinical exposure, it is also essential to retain a formal means for acquisition and development of anatomical knowledge which the students may not be able to obtain from any other source. In the problem-based curricula described by Lam et al., 2002 and Guldbrand et al., 2003, students have attributed a lack of ability in understanding the practical sessions related to clinical application in part to the lack of a strong foundation in the basic sciences. Thus, it appears that effective early clinical skills training needs to be careful integrated with the acquisition of appropriate knowledge of basic science disciplines, including Anatomy.
Interviewees recognised the importance of anatomical terminology in medical communication. This was exemplified by Interviewee 3’s comments on the knee (see Chapter 4, Section 4.5, page 106). This view corroborates those of a number of authors who have emphasised the importance of Anatomy. Barrows (1991); Charlton (1991); Esperança-Pina et al. (1992); Monkhouse (1992) and Pinto-Machado (1996) have all stated that the skills and knowledge gained in the context of teaching and learning Anatomy play a fundamental role in guaranteeing the quality and performance of doctors. Hence all doctors need to know the basis of Anatomy in order to identify the clinical problems, arrange the appropriate investigations for their patients and to interpret the results. The need to review the medical curriculum could be seen as the recognition of the importance of Anatomy to the medical profession. This supports the view of Hines (1979) who said that knowledge of preclinical subjects must facilitate every aspect of history taking, examination, and treatment of patients, even though that knowledge may have been applied unconsciously. What requires careful consideration, however, is how much Anatomy and what specific content is taught, as well as how and when it is taught.

Teaching-learning methods for Anatomy

While there is clearly acceptance of the importance of Anatomy as an integral component of the medical curriculum as well as a general trend towards promoting vertical integration of basic sciences, there is a parallel movement to consider the process by which students acquire necessary information. Pinto-Machado (1991) argued
that core course Anatomy should be taught in a way that promotes an understanding of what is experienced in clinical practice. Gustavson (1988) also stressed this, reporting a student comment: “it is as if the Anatomy class was a ticket to the rest of the training to become a physician.” The traditional method by which medical training is still being conducted at UEM, and that of the Anatomy course in particular, were not recognised by the students as having a negative impact on their ability in clinical practice. In fact, the data obtained could be interpreted as the participants of the study perceiving the teaching strategies used in Anatomy as truly useful. It worth noting that in spite of the recent re-introduction of dissection (Rodrigues, 2000) at UEM, due to the shortage of cadavers, the practical classes based on dissection have not achieved the departmental expectations in terms of stimulating the development of skills.

The importance of dissection in the medical training was clearly stated by the interviewees. As explained by Interviewee 3: “Although dissection as practical component of the course is done in a very short time, I have enjoyed it. Sincerely, it gave me the opportunity to get a three-dimensional image of the organs that help in the logical thinking required when assessing a patient”. This view support the findings of Lam et al. (2002) who reported that students found it easier to remember what they had been taught in the practical classes than in the lectures. The participants agreed with the importance of dissection similarly reported by Dyer and Thorndike (2000) who stated that, in the context of medical training, performing dissection was considered an excellent way to learn Anatomy, and is one which remains central to the practice of medicine.
According to Romanes (1998), dissection is only a means to the end of a fuller understanding of function. Undoubtedly in the case of trauma patient, knowledge of the movements at joints, the muscles that move them, and the nerves that supply these structures is essential if the effects of injury or disease are to be understood and rational corrective measures undertaken.

Expectations regarding outcomes of the medical course

The interviewees perceived two major obstacles to the acquisition of the expected knowledge and development of a high level of clinical competence: the overloaded curriculum and the large burden of medical duties required in the Department of Casualty and Emergency. This echoes the views of Gruppen et al. (2000) who argued that the demands of the attending physician, the students’ patient responsibilities, the assignment of students to particular clinical services, and the teaching provided by residents and attending physicians on daily rounds are all influences on learning that are largely outside the students’ control, but presumably affect their development of diagnostic skills.

The interviewees had fairly strong views on the effectiveness of the Anatomy course as a preparation for the clinical phase. It is now well recognized that medical educational activity should be related to the work that physicians do, which involves much more besides the diagnosis and treatment of patients’ diseases (Hill et al., 1998; Cantillon & Jones, 1999; Hyppölä et al., 2002 and Wun, Dickinson & Chan, 2002). Thus, medical schools should ensure that at the completion of undergraduate training students have acquired those skills that enable them to meet the demands of
their professional life. In the case of UEM it is particularly important that the curriculum should be revised to accommodate the most pressing health needs of the country and that the students are adequately trained to fulfil this role.

5.1.2.2 *Is there a relationship between performance in Anatomy and other disciplines as recognised by the students?*

When the students performance in Anatomy and related courses was considered it was found that few students attained good grades particularly in Anatomy, Physiology and Biochemistry. The few relationships found between courses were related to courses other than Anatomy. The Physiology grade was strongly positively related to both the Histology grade and the grade in Internal Medicine. This is understandable since Histology provides the structural basis for understanding function and physiological principles underpin the Pathophysiology that is fundamental to Internal Medicine. As stated above, it is well recognized that Anatomy provides a foundation for medical training and it was expected to find a strong relationship between performance in Anatomy and other courses. The absence of such a relationship was thus surprising. However, it should be stressed that in the Faculty of Medicine of UEM it was reported by Grupo de Reforma Curricular (2004) that there was an evident discrepancy between the assessment procedures of the different courses which may influence the students’ performance and thus the relationship between the grades of the courses.

Therefore, one explanation for the results obtained when comparing the students’ performance in Anatomy and related courses could be the direct consequence of the
influence of the assessment procedures applied by the different courses at the Faculty of Medicine of UEM. For example, it is more common to test memorization in Anatomy while Internal Medicine tests interpretation and decision-making. In addition it should be taken into account that in using the reported marks for the different subjects in the questionnaire, accuracy could have been affected by reliance on the students’ memory of something which had happened several years previously.

As West & Farrow (1996) stated, differences in mean marks could reflect differences in student interest, teacher expectations or could be explained by the number of assessments, reflecting greater inter-student variability early in the course. Studies such as that of Kolars et al. (1997) and Pearson, Rolfe & Henry (1998) have revealed a weak relationship between medical grades and later professional performance. In the same context, Balla et al. (1990) stated that there is a lack of a demonstrable relationship between the ability in making diagnoses and Anatomy knowledge tests.

There were no statistically significant differences between the students who had performed well in Anatomy and those who had positively rated any of the sub-scales or total scale in the cross-sectional sample. Thus, for this sample, performance in Anatomy does not seem to impact on the perception of the influence of the teaching-learning process of Anatomy at the Faculty of Medicine at UEM on their medical training or practice.

A possible explanation for this finding may be drawn from the findings of Morgan & Cleave-Hogg (2002) since, according to them, reasons for no correlation between experience and performance assessments as well as between students’ level of
confidence and either clinical or written examination grades may have included: (a) the quality of the learning experience; (b) the quality and amount of supervision and feedback received during skill acquisition; (c) how important the students perceive the learning of the skill to be; (d) the enthusiasm of the instructor and student in the educational process and (e) the validity of the performance assessment itself.

It is evident that there is a need to review and to improve the assessment of the students in order to have a clearer, more adequate and comparable procedure in grading the students. Thus, it appears that aspects of assessment may be another weakness of the medical training programme at UEM. The scope of this study has not included an evaluation of the assessment procedures in Anatomy and this is clearly an important area in which further research is needed. Therefore there is a need to review the assessment procedures/systems, particularly in basic sciences and within them in Anatomy, in order to match its role in medical education,

5.1.2.3 Do medical students demonstrate a satisfactory knowledge of Anatomy in dealing with patients in practice?

As expected, the junior doctors’ use of anatomical terms in the clinical reports was in general better than that of the senior students. When asked about the absence of accurate details of the patients’ complaints and physical examination, all the interviewees clarified that it is more easier to say upper limb than arm/forearm/hand and it becomes worse if it is necessary to add things like “at the 1/3 superior part of
the antero-lateral face of the right forearm” to indicate for example a trauma present at the level of the head of the radio bone radius.

In the reports the probable diagnosis was superior to the use of anatomical terms and the description of physical examination, for both groups. A correct diagnosis was suggested in 86% of the junior doctors’ and in 80% of the senior students’ reports. It was interesting to discover that only during the interviews did the participants (including those who produced good clinical reports) realise that they were using their knowledge of surface Anatomy when they are carrying out the inspection and palpation, during the physical examination. All the participants in this part of the study stated that a very short physical examination could be more useful than a complete one if it is well oriented to the patient’s complaints in conjunction with a structured analysis of the possible related consequences. This was believed to be true particularly with regard to the trauma patients, since the interviewees felt very well trained in managing this type of patient. It is evident that a focused examination may be more informative than an uncritically complete one. However to act as a doctor the students are being trained to perform a physical examination which allows them to identify concomitant pathology.

This point relates to the position of Munro & Campbell (2002) when arguing that in the context of medical practice, the key point of successful medical performance in assessing a patient is at least to listen to the patient’s history and assess the impact of the symptoms on the patient’s normal structure and function. This is supported by a number of authors (for example Heylings, 2002 and Prior, Silberstein & Stang, 1981) who have made a plea for a greater emphasis on an understanding of the study of the
structure and functions of the living body where the accurate physical examination should be accomplished only after a detailed history is taken to achieve a correct diagnosis.

It is of particular importance to note that the participants were worried about their ability to interpreting radiographs, particularly if there is a possibility of the existence of a fracture which is not always too obvious. This was the explanation for sending patients to the trauma sector at the Orthopaedic Department without checking the results of the requested radiographs. All of the interviewees suggested a need to improve their ability to interpret the necessary medical investigations in order to establish the correct diagnosis.

Therefore, as concluded by all the interviewees, to make life easier for themselves and particularly to carry out an evaluation of the patient, most commonly it is only necessary to report the most positive things or simply the reason for sending the patient to a specialist, for example a possible fracture in the leg; disability in moving the hand; contusion of the arm; fall in the street or simply a car accident. It points to the weakness of the clinical records instrument in providing reliable data about the link between knowledge of Anatomy and clinical practice and emphasises the need of interviews used in this study.

The use of anatomical terms and the quality of the suggested diagnosis were highly related for the senior students as well as for the junior doctors. Similarly, the accuracy in suggesting a diagnosis and the quality of the proposed therapeutic/diagnostic procedures were also highly related for both groups (senior
students and junior doctors). According to the participants there is no need to explain, for example, that a radiograph was requested only for the patient’s satisfaction and not as a necessary investigation. Thus, it is clear that the use of a few words does not necessarily imply that things were done in an incorrect sequence.

Furthermore, the clinical form at the Emergency is used only once. Even if the patient is seen again after a few minutes, a new clinical form has to be used. In these cases it is seen as a waste of time to record in detail of what has been done if it will not be read, since if the patient has to be seen by a specialist, he/she will restart the clinical evaluation without considering the notes made by the other clinicians.

Although the students did not always record the anatomical information on the forms, the obvious need for anatomical knowledge supports the view that the practice of clinical medicine requires a variety of capacities, knowledge and skills amongst which the skills and knowledge gained in the context of teaching and learning Anatomy may play a fundamental role in contributing to the quality and performance of doctors (Barrows (1991); Charlton (1991); Esperança-Pina et al. (1992); Monkhouse (1992) and Pinto-Machado (1996). Hence all doctors need to know the basis of Anatomy in order to identify the clinical problems, arrange the appropriate investigations for their patients and to interpret the results.

It was clear for the participants that, as stated by Moore & Agur (1995), medical communication depends on Anatomy since anatomical terms form a major part of medical terminology. This aspect was highlighted by Interviewee 3 who stated: “If we consider that for example the word knee, which could be considered as a trivial
word, is an anatomical term. It means that it is not possible to communicate in medical context without using Anatomy. In addition, it is necessary to remember that the human body has the left and right knee then… neither communicating nor reasoning is possible without Anatomy.” Thus, the lack of evidence of an ability to use anatomical terms appropriately in the clinical reports could be interpreted as a deficiency of the clinical forms which did not require an extensive/clear report. However the inability to apply anatomical terms correctly and consistently cannot be excluded as a possible weakness of the medical training at UEM, particularly that in the Anatomy course. The interviewees have argued that “it is evident that there is a need to improve the quality of the clinical report particularly when considering the clinical procedures but it implies a need to improve the medical training”.

At UEM, the means by which students learn clinical skills has remained largely rooted in the traditional, rote-learning model exemplified by the typical “introduction to clinical medicine” where the students are asked to learn the complete history and physical examination through a mechanistic, protocol driven process that encourages exhaustive and uncritical data collection. This may explain the reasons for having more correct diagnoses than good descriptions of the physical examination for example, since the patient cases were very common ones (as was explained by the interviewees), and reduced the need to spend time searching for something they knew from the beginning.

Anatomical knowledge as applied to clinical practice was viewed as a cornerstone of the medical training at UEM. The interviewees suggested that there is a need to improve the relationship between what has been taught in Anatomy and what is needed for medical practice. The need to review the medical curriculum could be
seen as the recognition of the importance of Anatomy to the medical profession. However, elsewhere in the world the need to review medical training is also evident from various publications over the past few decades including those of Patel & Dauphinee (1984); Patel, Groen & Scott (1988); Hyppölä, et al., (2002) and Rolfe & Sanson-Fisher, (2002) who have reported that there have been serious attempts to change medical training to improve medical competence by applying early and frequent clinical exposure, problem-based learning, community-oriented education, integration of basic and clinical science, interpersonal skills and self-directed learning.

5.2 CONCLUSIONS

The study was directed at answering three key questions relating to the role of teaching-learning Anatomy in the medical curriculum at UEM. The outcomes of the questions posed can be summarised as follows:

5.2.1 Research question 1: Is the Anatomy course perceived by the students as structured to address their needs regarding the medical practice?

All the responses on the teaching-learning process of Anatomy at UEM were positive toward each of the sub-scales (quality of Anatomy teaching at the Faculty of Medicine at UEM; teaching strategies used in Anatomy; perceived benefits of learning Anatomy; ability in applying the anatomical knowledge in clinical practice and the usefulness of Anatomy to the other medical courses).
These values suggested that the present medical curriculum at UEM met the students’ expectations regarding their medical training. However, the in-depth study, through the interviews and evaluation of the clinical reports showed that there is in fact a need to adjust the quality of medical training to meet expectations regarding medical competence. There is a need to review the current medical curriculum in order to achieve better integration between the courses and cycles (basic and clinical) and particularly to improve the efficacy of the teaching-learning process by selecting the content more appropriately and adjusting the assessment procedures.

5.2.2 **Research question 2:** Is there a relationship between performance in Anatomy and other disciplines as recognised by the students?

There were relatively few students who attained good grades specifically in Anatomy, which may explain in part at least, the absence of a relationship between participants’ performance in Anatomy and related courses. As discussed above, one possible explanation for these results could be the direct consequence of the influence of the assessment procedures applied by the different courses at the Faculty of Medicine of UEM. Therefore, this suggests that the assessment procedures should be one of the key points to review within the curricular reform.

5.2.3 **Research question 3:** Do medical students demonstrate a satisfactory knowledge of Anatomy in dealing with patients in practice?

The junior doctors’ use of anatomical terms in clinical reports was in general better than that of the senior students and the junior doctors’ reports of the physical
examination were more coherent than that of the senior students. The majority of the reports showed a probable diagnosis based on the clinical history. It is therefore not so much anatomical knowledge *per se* which is deficient (since the junior doctors would be more likely to have forgotten facts) but the appropriate application of that knowledge which could be improved. Clearly, the superior experience and confidence of the junior doctors have contributed to their ability to apply the knowledge acquired several years previously.

From the interviews it was possible to conclude that the importance of Anatomy is well recognised within the medical training/practice but this importance needs to be adjusted to the real role of Anatomy since the participants reported a lack of ability in applying anatomical knowledge in the clinical context. This suggests that even with more experience, i.e. at the level of the junior doctors, the application of anatomical knowledge in medical practice does not always achieve what might be expected of a qualified doctor. However, it should be noted that the relative differences between the ability of senior students and junior doctors to use anatomical knowledge may indicate the need for different teaching methods in the earlier years with more emphasis on application. Changing the learning experiences of the undergraduate students may enhance the ability of the senior students and thus help to reduce the gap between what the senior students and the junior doctors currently accomplish through experience in the wards. Therefore, the teaching-learning process of Anatomy as well as the structure of the medical course should be changed in order to improve the quality of outcomes gained in the context of Anatomy and, as a consequence, improve the medical competence.
5.3 RECOMMENDATIONS

At the medical school of UEM students start clinical activities in the 4th year at which time they are expected to participate in patient-care activities, including care coordination, data gathering skills and patient-interaction techniques, with minimal time given to diagnostic reasoning. Thus, to meet the real needs of clinical practice, a priority should be the clinical exposure of students by engaging them in clinical problem solving appropriate for their level of training in the basic cycle which would allow them to develop better clinical reasoning.

In addition, during the basic cycle it is important to develop and stimulate skills which express the applicability of knowledge as required in medical practice. To this end, horizontal integration of the pre-clinical disciplines (Anatomy, Histology, Physiology, Biochemistry, Microbiology, etc.) should be seen as a necessary action to be implemented in association with the integration of the pre-clinical disciplines with the clinical ones (Surgery, Internal Medicine, Neurology, Infectious Diseases, etc.). More vertical integration would thus also appear to be indicated.

Moreover, further studies are needed to better understand the impact of assessing the outcomes of the basic sciences such as Anatomy on the educational process as well as on medical performance/competency.

All of these recommendations should be seen within the perspective of the need for improving the quality in accordance with the international recommendations assumed in Edinburgh (WFME\textsuperscript{a}, 1998) and prescribed in the project on International Standards in
Medical Education of the WFME (WFME\textsuperscript{b}, 1998; WFME, 2000) which states: “The core of the medical curriculum consists of the fundamental theory and practice of medicine, specifically basic biomedical, behavioural and social sciences, general clinical skills, clinical decision skills, communications abilities and medical ethics. These elements have important bearing on the concept of international standards in medical education and must be addressed by all medical schools aiming to produce safe practitioners of quality.” (WFME, 2000: 667).

The standards in the area of educational programme and principles prescribed in the WFME document (WFME, 2000) stress that “the medical school must define the curriculum models and instructional methods employed (discipline-, system-, problem-based, etc.) on the basis of sound learning principles” (WFME, 2000: 670).

The present study has thus taken cognizance of the WFME recommendations for improving the quality medical practitioners by seeking to better understand the teaching-learning of Anatomy at UEM with the aim of implementing curricular change in those areas which may best contribute to improving the competence of the medical graduates to better meet the health care needs of the Mozambican society.