EDUARDO MONDLANE UNIVERSITY

Faculty of Education

Master in Higher Education Studies and Development

Research-teaching nexus in Mozambican higher education curricula

The case study of Eduardo Mondlane University

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A dissertation in fulfilment of the requirements for the degree of Master

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DECLARATION

I hereby declare that this dissertation entitled "Research teaching-nexus in Mozambican higher education curricula" the case study of Eduardo Mondlane University has never been presented in its essence, for the attainment of any degree and all sources or quotations that I have used results from my research as indicated in text and references.

Vieira Januário Covele

20 April 2017

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ABBREVIATIONS AND ACRONYMS

CELC Civil Engineering Licenciatura Course

EELC Environmental Education Licenciatura Course

EBL Enquiry-based learning

PBL problem-based learning

RTN Research-teaching nexus

SPSS Statistical Package for Social Sciences

UEM Universidade Eduardo Mondlane

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KEYWORDS

Research-teaching nexus

Research-based

Research-tutored

Research-oriented

Research-led

Student-focused

Deep learning

Scholarship

Teacher-focused

ABSTRACT

This study was concerned with the nexus of research and teaching in higher education through four curriculum designs: research-based, research-tutored, research-oriented or research-led and the teaching practices at UEM as a result of these curricula. The purpose of the study was to examine the four curriculum designs mentioned earlier and their teaching methods and learning approaches in order to link research and teaching effectively in higher education. In this context, the study was guided by specific objectives as follow:

- To identify, analyse, compare and contrast the curriculum designs used by the teaching staff to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.
- To relate the curriculum designs to teaching methods and learning approaches used to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.
- To identify, analyse and evaluate the types of teaching and learning activities, classroom interactions between the lecturer and students and/or the types of classroom interactions between students themselves as well as the role of the lecturer and the role of the students in the process of teaching and learning in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

The study employed a case study as a research design and involved a sequence of research methods, namely qualitative semi-structured interviews with lecturers and students in the EELC and CELC, qualitative documentary analysis of curriculum designs from the EELC and CELC, quantitative structured observation of one stream in the EELC and another stream in the CELC and quantitative questionnaires for lecturers and students in the EELC and CELC. The Qualitative and quantitative research methods were used in the sense that they could complement one another in data collection, analysis and interpretation of findings in order to give quality and validity to the study. In this context, the data were analysed both qualitatively and quantitatively.

The study was based on the broader framework of the concept of the research-teaching nexus in higher education. The study analysed four dimensions (variables) of the concept of the research-teaching nexus: research-based, research-tutored, research-oriented or research-led and their respective indicators as well as teaching methods and learning approaches in attempt to link teaching and research in higher education.

The findings generated by this study revealed that the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM predominantly used a research-led curriculum in which the main indicators comprise learning about others' research, lectures and traditional written tests and examinations. Furthermore, the research-led curriculum is associated with the lecturer-focused method (information transmission) in which the lecturer plays an active role of knowledge transmitter through lectures and students plays a passive role of knowledge receiver leading to surface or strategic approach to learning. As a consequence, this weakens the integration of research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

The study contributes to the understanding of the state of the research-teaching nexus in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM in the scope of curriculum designs, specifically research-based, research-tutored, research oriented or research-led and teaching practices. In this view, the study may raise awareness on curriculum designs and teaching practices as well as teaching methods and learning approaches that may weaken or strengthen the link between research and teaching in higher education.

CHAPTER 1 INTRODUCTION TO THE STUDY

1. 1 Background information of the study and research setting

This study is about 'The research-teaching nexus in Mozambican higher education curricula'. The research-teaching nexus refers to linkages, that is, relationships and interactions that may exist between teaching and research in higher education through curriculum designs and teaching practices. The research was a case study of Eduardo Mondlane University (UEM) and was held from June to December 2015. This study involved final year undergraduate students from licenciatura level and their teaching staff in the Environmental Education Licenciatura Course (EELC) of the Faculty of Education and the Civil Engineering Licenciatura Course (CELC) of the Faculty of Engineering at UEM. UEM is a public and the oldest university of Mozambique and it is located in Maputo the capital of this country. According to Cumaio, António and Baptista (2012) UEM has its main campuses located in Maputo the capital of Mozambique and its branch campuses located in some provinces of this country namely Gaza Province, Inhambane Province and Zambézia Province. UEM runs courses in the academic fields such as education, engineering and among others. In this context, the purpose of this study was to explore how the teaching staff at UEM establish a link between research and teaching through curriculum designs and teaching practices in different fields of education and engineering involving soft disciplines and hard disciplines respectively and analyse the teaching methods and learning approaches used to link research and teaching in higher education.

Linking research and teaching through curriculum designs and teaching practices was the focus of this study since one of the main functions of a university is production or construction of knowledge. In line with Castells (2001, p. 208), "what seems today to be the…most obvious function of the university, that is the generation of new knowledge is, in fact, the exception throughout the world. In many [universities] it had not yet been fully recognised as a fundamental task…" Meanwhile, the link between teaching and research through curriculum designs and teaching practices can help the university to advance the generation of new knowledge because the teaching staff and students are researchers and do research together throughout the course curriculum development. Trow (1970) advocates that the university is responsible for

production of new knowledge through research and scholarship. In this view, linking research and teaching can result in research-based learning in which learning is centred on the student. In this context, the lecturer and the student are both learners and they learn through research-based activities such research projects or fieldwork including scholarship, namely scholarship of discovery, scholarship of integration, scholarship of application as well as scholarship of teaching and learning. Thus, these activities may strengthen the link between teaching and research in higher education.

1.2 Motivation of the study

Personal and scholarly reasons are the ones that have motivated me to do the study on the topic 'Research teaching-nexus in Mozambican higher education curricula'.

In terms of personal reasons, I am intellectually curious about how to link research and teaching in higher education as I am a postgraduate student and after my graduation I would like to be an undergraduate higher education lecturer and researcher simultaneously.

For scholarly reasons, Brasov (2007, p. 80) has inspired me to do this study because the author states that "a sector of the society which involves two different types of activities is higher education. The two principal activities are teaching and research. It is of course of highest interest to know and understand whether a synergy between these processes could exist and what are the mechanisms that govern this effect." This statement suggests that although teaching and research are different activities, they may work together in the process of teaching and learning in higher education. However, there is a need to understand how the teaching staff can establish a synergy between teaching and research in higher education. Elton (2001, p. 8) postulates that "the real locus of the teaching-research link does not [only] lie in teachers or students, but also in the curriculum [design] and process - to be interpreted in its wide sense, i.e. all that contributes to learning experiences of the students in which both [teachers and students] are engaged." This means that a link between research and teaching may be reflected in the design of the curriculum as well as in the process of its implementation in which both teacher and students are active learners. Thus, in this study, I was interested in understanding the types of curriculum designs that have

been used by lecturers to link research and teaching in undergraduate levels at UEM. At the same time, I tried to understand the teaching methods and learning approaches used in the process of teaching and learning in order to link research and teaching in undergraduate level at UEM.

1.3 Significance of the study

This study may be regarded as significant because it focuses on curriculum designs which may contribute to the linkage of research and teaching in higher education. In this way, the study may raise awareness of the research-teaching nexus (linkage) among lecturers and students. In addition, the curriculum designs that link research and teaching may promote enquiry-based learning approaches in which the learning process is focused on the students. In this case, the students are responsible for production, construction or deconstruction of knowledge under the assistance of a lecturer as a facilitator. Moreover, enquiry-based learning may result in the relevance of the curriculum in higher education since students may be involved in research-based activities. These activities may stimulate students to do research on real life problems that affect society in general or communities. In turn, research-based activities can help students integrate theory and practice and develop comprehensive skills such as critical thinking, problem solving, creativity, collaborative skills, communication and others needed for the academic life and the labour market.

1.4 The purpose of the study

Elton (2001, p. 1) sates that "discussion of and research into the question of a link between research and teaching has proliferated. Although in the process of much significance has been learned, general insights have only rarely emerged." This statement suggests that more studies should be conducted in order to understand the insights of research-teaching nexus in higher education.

Thus, the purpose of this study was to explore how the teaching staff establish a link between research and teaching through curriculum designs and teaching practices at UEM and analyse the teaching methods and learning approaches used to link research and teaching in higher education.

Yesufu (1973, p. 84) argues that "research is inseparably complementary to teaching

in the university…" This implies that in higher education, research and teaching may work together and support each other. Hughes (2004) supports that research has positive effects on teaching and also teaching has positive effects on research. For example, research can help higher education lecturers update their knowledge on theoretical or applied research in a discipline. Simultaneously, research can help higher education lecturers update methodological approaches and current developments in a discipline. Meanwhile, teaching can make researchers aware of a discipline and conceptualisation of some research topics. Moreover, new interests of students' learning and questions raised in the process of teaching can stimulate researchers to do their research as Prince et al. (2007) defend that experience from teaching a subject can help teacher gain deeper understanding of the subject and it can motivate teachers to conduct further or advanced research in the subject area.

1.5 Research aim

This study aims to understand the linkages between research and teaching from the point of view of curriculum designs and teaching practices used in Mozambican higher education.

1.6 Objectives

- To identify, analyse, compare and contrast the curriculum designs used by the teaching staff to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.
- To relate the curriculum designs to teaching methods and learning approaches used to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.
- To identify, analyse and evaluate the types of teaching and learning activities, classroom interactions between the lecturer and students and/or the types of classroom interactions between students themselves as well as the role of the lecturer and the role of the students in the process of teaching and learning for integration of teaching and research in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

1.7 Statement of the problem

The law number 27/2009 of 29 September about higher education in Mozambique in its Article 7 concerning with scientific and pedagogical autonomy in number 1 of the lines b), d) and e) claims that higher education institutions have scientific and pedagogical autonomy that give them the capacity to teach, research and enquire according to the beliefs of the teaching staff under academic freedom. At the same time, higher education institutions have scientific and pedagogical autonomy that give them the capacity to design course curricula and develop their own programmes paying attention to the labour market. Moreover, higher education institutions have scientific and pedagogical autonomy to define teaching methods and decide on assessment processes introducing new pedagogical experience (Premugy, 2012, p. 25-28). The article 7 of the law mentioned earlier acknowledges that enquire, research and teaching activities should be carried out in Mozambican higher education institutions. In addition, higher education lecturers are responsible for designing course curricula and developing their own programmes suitable for the labour market as well as teaching methods and assessment criteria. However, there is a need to understand how the teaching staff at UEM establish research-teaching nexus in higher education through four curriculum dimensions (variables), specifically research-based, research-tutored, research-oriented and research-led. Thus, the main aim of this study was to examine the linkage between teaching and research at UEM through curriculum dimensions (variables) mentioned earlier and teaching practices. Likewise, this study was interested in understanding the teaching methods and learning approaches that have been used in order to link teaching and research at UEM.

1.8 Research questions

1. What dimensions of curriculum designs have been used to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM?

2. What are teaching methods and learning approaches used to integrate research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM?

3. What are teaching practices used by the teaching staff to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM?

1.9 Organisation of the dissertation

This dissertation has been organised in six chapters. Chapter 1 is concerned with the introduction to the study. This chapter comprises the background information of study and the main goals of the research as well as the questions for the research. Chapter 2 is related to the literature review of the study. This chapter begins by introducing the literature review and defining the concept of the research-teaching nexus. It then goes on to discuss different ways of integrating research and teaching together and examines teaching methods for linking research and teaching in higher education. Likewise, chapter 2 discusses the relationship between teaching and research and analyses the conditions that influence this relationship in higher education. This chapter concludes by summarising the literature review and providing the conceptual framework of the study. Chapter 3 is about the research methodology and research design. Chapter 3 gives an overview of research approaches and discusses four different research methods (a qualitative semi-structured interview, a qualitative documentary analysis, a quantitative structured observation and a quantitative questionnaire) that the study used for data collection. This chapter also includes how data were analysed, validity of the study and ethical considerations of the study as well as limitations of the study. Chapter 4 focuses on the data presentation of the variables research-based, research-tutored, research-oriented or research-led and teaching practices obtained through four research methods mentioned earlier. Chapter 5 is related to the discussion of the key findings of the study. This chapter discusses the key findings of research-based, research-tutored, research-oriented, research-led and teaching practices. Chapter 6 is the last one and it deals with the conclusion of the study. Further, chapter 6 presents a synthesis and theoretical implications of the main findings of the study as well as the limitations of the study and it draws a general conclusion of the study and provides recommendations for future research. In addition, references, appendices and tables are included in this chapter.

CHAPTER 2 LITERATURE REVIEW

2.1. Introduction

As previously stated, the purpose of this study was to understand how the teaching staff at UEM establish linkages between research and teaching through curriculum designs and teaching practices and analyse the effectiveness of teaching methods used by the teaching staff to develop the linkages between research and teaching in higher education. This chapter reviews existing literature concerning with the research-teaching nexus in higher education. The literature review has been divided into five sections. The first section introduces the concept of the research-teaching nexus in higher education. The second section discusses the models of the relationship between research and teaching in higher education. The third section attempts to establish a mutual relationship between research and teaching. The fourth section provides the summary of the relationship between teaching and research in higher education. Finally, the fifth section is concerned with the conceptual framework of the study.

2.2 The concept of the research-teaching nexus in higher education

This section attempts to give a definition of the concept of the research-teaching nexus. Meanwhile, in the literature review, the concept of the research-teaching nexus has multiple definitions. However, the literature fails to give theoretical definitions of the concept of the research-teaching nexus instead the literature provides descriptions and/or illustrations about how the concept may be developed. In this context, Healey (2005) has defined the research-teaching nexus as many different linkages that exist between teaching and research in a curriculum design (see figure 3 on page 14). These linkages dependent on the extent to which teaching is student-focused, that is, students participate in knowledge building through research activities or teaching is teacher-focused which means that the lecturer transmits knowledge to students and the students are passive recipients of knowledge transmitted by the lecturer or the extent to which emphasis is given to research content or research processes and problems in the discipline.

Rowland (2005, p. 96) states that “inquiry is…a link between teaching and research. Teaching consists of instruction in the context of inquiry. Research publication (and

other research outcomes) consists of scholarly dissemination in the context of inquiry." This statement suggests that a linkage between research and teaching depends on the environment of enquiry. In this view, the research-teaching nexus may be defined as interaction between research and teaching through enquiry.

Brew (2006) has designed a new model of the relationship between teaching and research (see figure 2 on page 12). In this model, the research-teaching nexus may be defined as research-based learning in which students and lecturers learn and do research together. Thus, lecturers and students belong to the same scholarly knowledge building community.

While a variety of definitions of the concept of the research-teaching nexus have been suggested, this study used the definition suggested by Healey (2005) discussed earlier since the concept definition of the research-teaching nexus demonstrates how different curriculum designs: research-based, research-tutored, research-oriented or research-led can be used to integrate teaching and research in higher education which is the main focus of the study. In this context, the concept of the research-teaching nexus has been defined operationally, that is, how the concept works, but it lacks clear dimensions, measurements (indicators) and scales to be defined operationally. Therefore, in chapter 3, I proposed dimensions, measurements (indicators) and scales that may be used for a better understanding of the concept of the research-teaching nexus operationally.

Throughout this study, the concept of the research-teaching nexus is used interchangeably with relationship between teaching and research, linkages between teaching and research or integration between teaching and research.

2.3 Models of the relationships between research and teaching in higher education

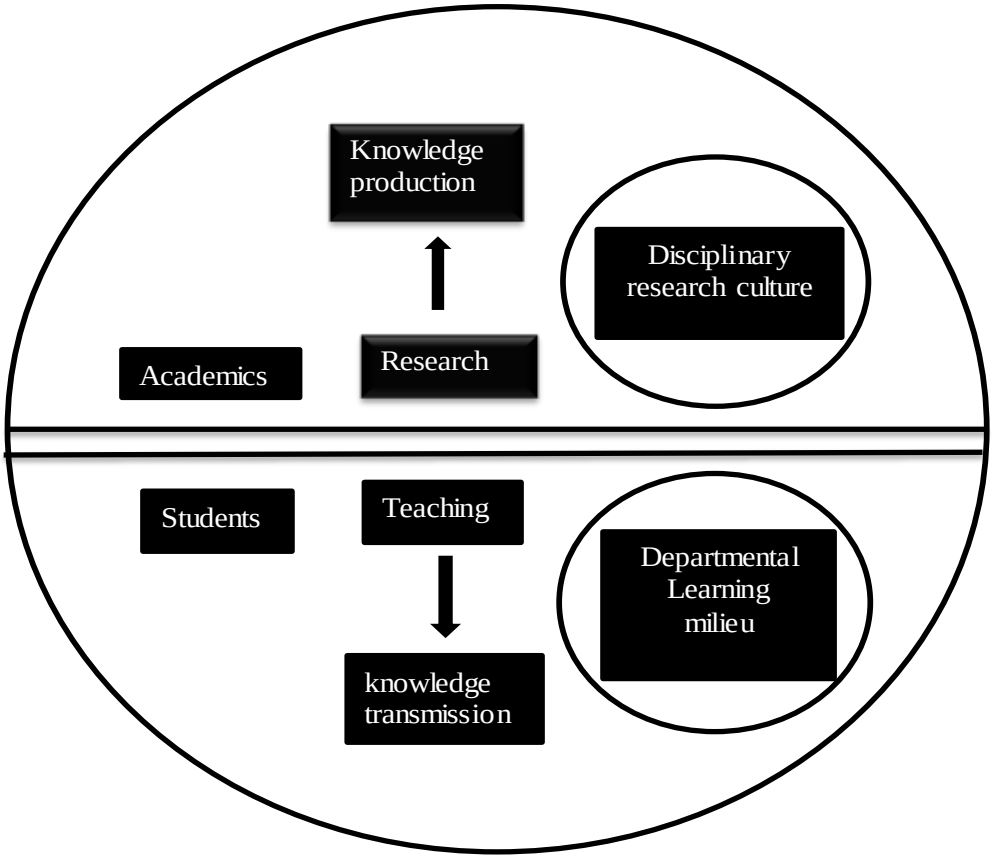
This section is concerned with models of the relationship between research and teaching in higher education and the section is subdivided into four sub-sections. The first sub-section focuses on a traditional model of the relationship between research and teaching. The second sub-section deals with a new model of the relationship

between research and teaching. The third sub-section discusses the relationship between teaching and research through curriculum designs. The last sub-section analyses the teaching methods in curriculum designs for integration of teaching and research.

2.3.1 A traditional model of the relationship between research and teaching in higher education

According to Clark (1983, p. 16) "the basic tasks, teaching and research, are both divided and linked by speciality; professors [and students] are similarly divided. This is so evident in all structures of higher education – medieval or modern, developed or developing [higher education]…." This suggests that there is a divide between teaching and research in higher education institutions, which follow a traditional model of the relationship between teaching and research. In this context, Brew (2006) has illustrated a traditional model of the relationship between research and teaching in higher education where there is a divide, that is, separation between the two activities (see figure 1 next page).

Figure 1: Traditional model of the relationship between teaching and research



Source: Adapted from Brew (2006)

In figure 1 given earlier, Brew (2006) shows two lines which separate research and teaching in higher education. Teaching and research are conducted separately from different space, time and human resources. In this case, research is considered as production of knowledge by only academics in the disciplinary culture. Likewise, the academics have separate space and time for research and teaching. This means that research is not conducted in the environment of teaching and vice-verse. Teaching is lecturer-focused in which the lecturer transmits knowledge to students. Knowledge is considered as absolute and specialised with no relationship with the experiences of the students. Therefore, students play a passive role in the process of teaching and learning. In addition, learning occurs in the boundary of a single discipline.

Brew (2012, p.108) sustains that "the conception of teaching in a [traditional] model

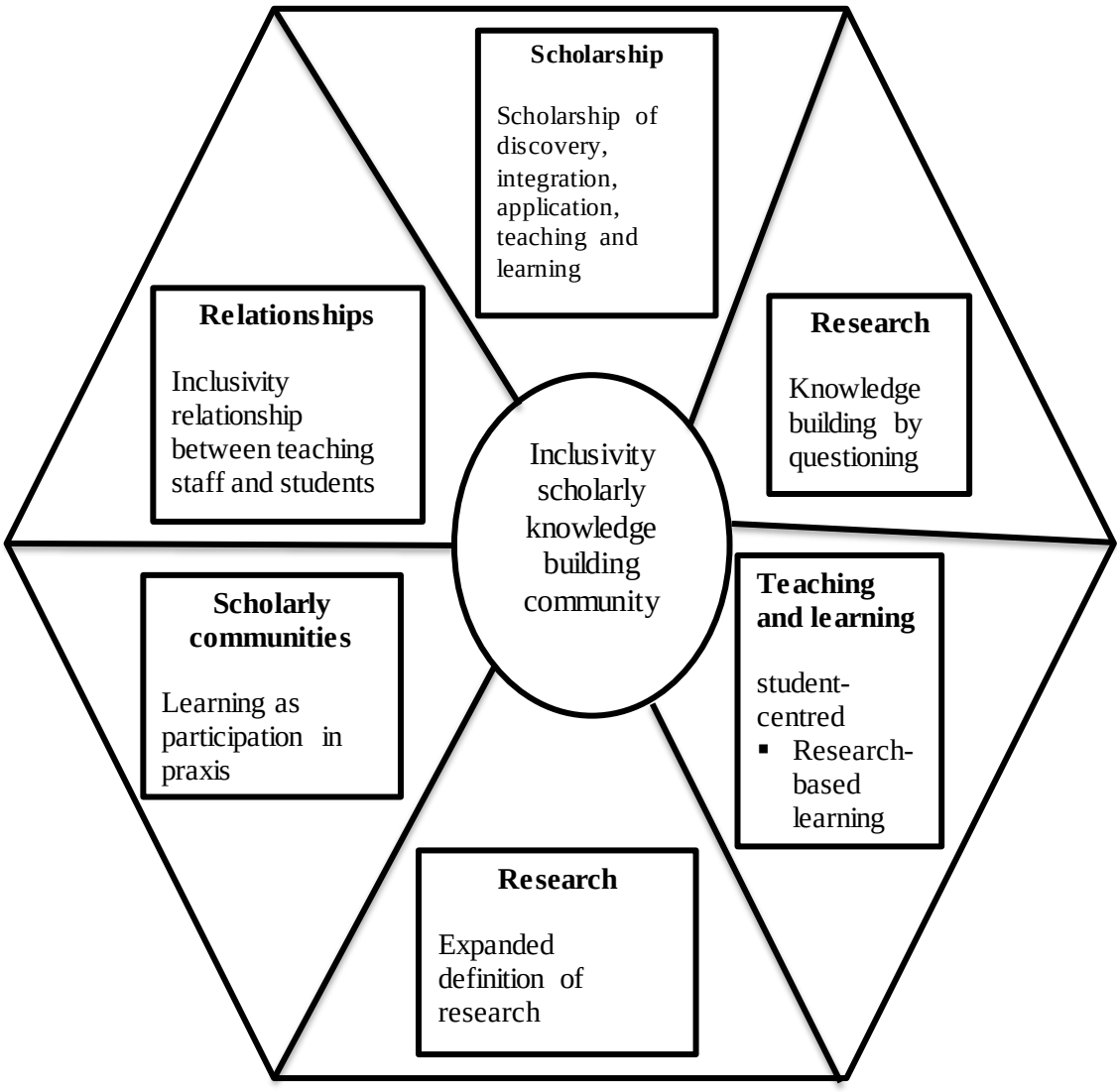
of the relationship between teaching and research is focused on the teacher and concerned with the transmission of information to students within a separate learning milieu which has little overt connection with the research culture." This means that in the traditional model of the relationship between teaching and research, the students are supposed to master bodies of knowledge of the discipline. However, the students may not be able to relate the bodies of knowledge acquired in the discipline to real life problems since they lack research skills. The lack of interaction between research and teaching in the traditional model may be influenced by the methods of teaching and learning such as the teacher-centred or information transmission method. Healey (2005) argues that in the teacher-centred or information transmission method, the lecturer plays an active role such as knowledge transmitter while the student plays a passive role, that is, a receiver and consumer of the knowledge provided by the lecturer.

According to Helle (2006), the information transmission or the teacher-centred method to teaching and learning relies on behaviourist theory of learning which considers learning as external regulated by the lecturer. This theory focuses on external behaviour of the student instead of his or her individual cognitive process. In this view, the information transmission or the teacher-centred approach is associated with a surface approach to learning in which facts, concepts and disciplinary skills are the main focus. Nonetheless, these are not related to the views or experience of the student.

2.3.2 A new model of the relationship between research and teaching in higher education

In a new model of the relationship between research and teaching, there is interplay between teaching and research. As can be seen in figure 2 next page, Brew (2006) has illustrated a new model of the relationship between teaching and research in higher education.

Figure 2: New model of the relationship between research and teaching



Source: Adapted from Brew (2006)

In figure 2, Brew (2006) shows that in the new model of the relationship between research and teaching students and the teaching staff are members of the academy community of practice. In this community, the teaching staff and students are engaged in research for knowledge building through enquiring. In this case, teaching and learning is centred on the student and this leads to research-based learning. In the new model, research has expanded definition rather than production of new knowledge. Likewise, research includes different scholarship, such as scholarship of

discovery, integration, application as well as teaching and learning. The academic staff and students learn and do research together and there is a mutual relationship between the teaching staff and students characterised by equality in discussion of knowledge.

Horta, Dantel and veloso (2012, p. 17) assert that "any of the teaching-research nexus requires taking into account connections between the two activities beyond the traditional concept of teaching and research." In the new model, teaching and research are connected activities and they have broad concepts as Eindhoven (2007) states that in the development of the research-teaching nexus, research and teaching should not only be considered as discovering or transmission of knowledge respectively since there are many associations concerning with research and teaching. According to Healey and Jenkins (2011), scholarship is one of the ways of making association between research and teaching. Boyer (1990) provides scholarship that may create association between research and teaching, namely scholarship of integration, scholarship of application or engagement and scholarship of teaching and learning. Scholarship of integration consists of integrating knowledge beyond the discipline or integrating life experiences with academic studies. Scholarship of application or engagement is concerning with the use of knowledge in society or application of knowledge in work places. Finally, the scholarship of teaching and learning which includes mentoring, peer support and assessment as well as collaborative group or teamwork.

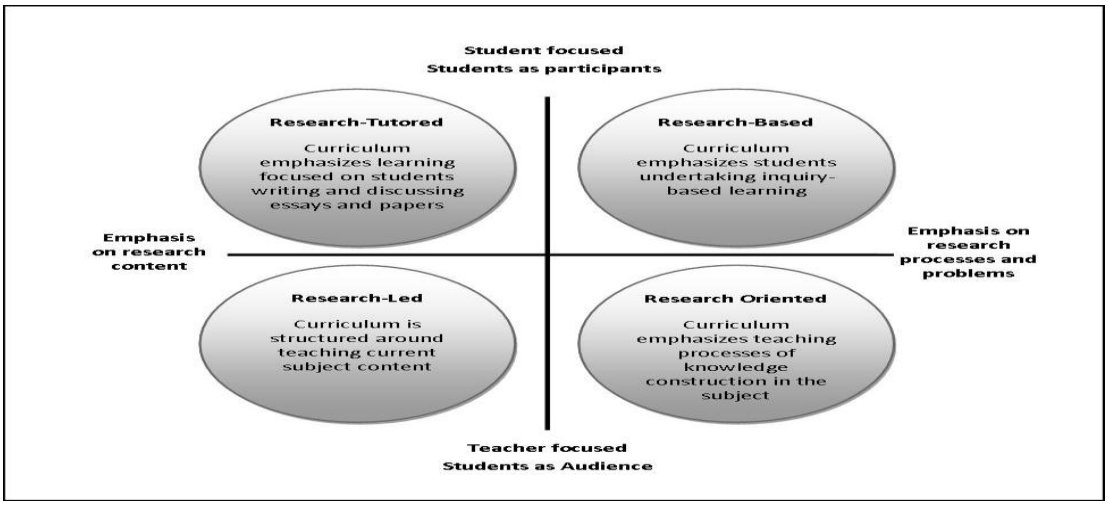
Robertson and Bond (2005, p. 84) assert that "lecturers and students in an integrated relation between teaching and research are learners. However, learning in integrated relation between teaching and research should reflect research mode." Elton (2005) argues that learning in research mode implies active involvement of learners in enquiry, which entails for example questioning of knowledge rather than the reaction of the input provided by the lecture. Brew (2006) supports that we should not assume that teaching is automatically linked to research or talking about research in lectures is enough to strengthen the link between teaching and research and enhance students' learning in research mode. Linkage between teaching and research should be designed in a [curriculum]. The next sub-section discusses how the relationship

between teaching and research can be established through curriculum designs in higher education.

2.3.3 The relationship between teaching and research through curriculum designs

Brasov (2007) asserts that research, teaching and learning can be brought together in the curriculum from different ways which involve, for instance, research into curriculum, research on student learning and research competencies. In this view, Healey (2005) has conducted research into curriculum and identified that the research-teaching nexus may be developed through different curriculum designs (see figure 3 below).

Figure 3: The relationship between curriculum designs and the research-teaching nexus



Source: Healey (2005)

As shown in figure 3, Healey (2005, p. 69) believes that "it is possible to design curricula which develop the research-teaching nexus, along three dimensions according to whether the emphasis is on research content or research processes and problems, the students are treated as audience or participants, the teaching is teacher-focused or students-focused." Nonetheless, the three dimensions emphasised in the curriculum have their respective features. Figure 3 demonstrates different ways of developing a nexus of research and teaching through curriculum designs, specifically

research-based, research-tutored, research-oriented and research-led. The top of vertical line indicates student-centred activities in which the student plays a role of an active participant, therefore, he or she participates actively in the activities. Whereas, the bottom of the vertical line indicates teacher-centred activities in which the student plays a role of an audience, that is to say, a passive participant. The horizontal line at the bottom left quadrant of the figure 3 shows emphasis on research content and the bottom right quadrant of the same line shows emphasis on research processes and problems. In this case, the research-based curriculum is located at the top right quadrant and the research-tutored curriculum is located at the top left quadrant. Likewise, research-oriented curriculum is located at the bottom right quadrant and finally the research-led curriculum is located at the bottom left quadrant.

Jenkins and Healey (2009) describe four different ways that can involve students in research, namely research-based, research-tutored, research-oriented and research-led. Research-based is concerning with understanding of research and enquiry; research-tutored entails involvement of students in research discussion; research-oriented focuses on development of research skills and technique and research-led emphasises learning current research in the discipline.

Griffith (2004) shares with Healey (2005) the same ways of integrating research and teaching through curriculum designs, specifically research-based, research-oriented and research-led. Nevertheless, Griffiths does not recognise research-tutored in his typology. Griffiths (2004) cited by Elsen (2009) sustains that research-based include activities that can help students undertake authentic research such as research projects. In these activities, both the lecturer and students are learners. Research-oriented is concerning with understanding of research processes for knowledge building in the area of the study. In addition, in research-oriented teaching focuses on awareness of research skills and research ethos while learning involves information or knowledge taught by the lecturer in the discipline.Whereas, research-led means that the teaching staff select the content according to their research interests and focuses more on information transmission method to teaching as well as awareness of research findings from others' research rather than research processes.

Healey and Jenkins (2014, p. 17) states that "research-tutored [is] engaging in research discussions the focus is on students and staff critically discussing research in the discipline, as for example, in many seminar-based courses." This statement suggests that in the research-tutored there are many academic readings and written work as well as oral presentations of academic work for discussion in the class. At the same time, the statement implies that there is supervision or peer review of the written work in which teacher may supervise academic work of the students or the students can supervise or peer review each other's academic work. Zeschel (2010, p. 3) claims that "in research-tutored teaching [and] supervision take students through published research and encourage them to reflect on their own understanding of the underlying rationale and concrete processes involved." In this view, research-tutored may help students to develop skills for critical analysis towards knowledge. Ashwin (2003) in Healey (2009) asserts that "[research-tutored] is student-focused and emphasizes research content. It is perhaps best illustrated by the Oxbridge tutorial system, where students engage in discussion with their tutors producing, in Oxford, an average of three papers or essays a fortnight." This assertion points out that research-tutored is associated with discussion of papers and essays under tutorial or supervision.

In research-based students conduct research and the curriculum encompasses research activities. These activities stimulate students to learn in a research mode. Therefore, in a research-based curriculum students are knowledge producer rather than knowledge consumer. By contrast, in research-tutored students are engaged in research discussions. At the same time, in research-tutored students and teaching staff do critical analysis and discussion of research through seminars. Whereas, research-led consists of learning contemporary research in the discipline, therefore, a research-led curriculum emphasises on prevailing and on-going research in the discipline to ensure that what students learn reflects updated research of the discipline. Finally, research-oriented focuses on awareness of research skills and techniques. Consequently, a research-oriented curriculum involves learning research methodologies and methods in order to obtain potential research skills and techniques in the discipline (Healey, Jenkins and Lea, 2014).

Jenkins and Healey (2009, p. 17) point out that "the four ways of engaging students with research and enquiry are not independent... many courses contain elements of more than one approach." This suggests that some elements of the four ways of involving students with research in attempt to link research and teaching in higher education may be used in different stages of a particular curriculum design and practices.

> *Few curricula fit entirely in one quadrant. Although most traditional university teaching takes place at the bottom left quadrant, some disciplines have relatively more activity in the other quadrants. For example, some departments concerned with professional education such as medicine, engineering, and social works focus their teaching on problem-based learning, a specialised form of enquiry-based learning, which falls predominately at the top right quadrant [see figure 3 on page 14]. Many more departments engage students in aspects of enquiry-based learning for small parts of their curricula (Healey, 2005, p. 7).*

This suggests that the four ways of engaging students with research in curricula, specifically research-based, research-tutored, research-oriented or research-led share some of their elements throughout a curriculum design and teaching practices. Healey, Jenkins and Lea (2014) argue that the four ways of engaging students with research can be used in an integrated way. Nonetheless, it is important to understand whether the students are involved in each of the four ways and reflect on the proportion of time spend in each category. The authors maintain that students would benefit from spending more time at the top half (research-based and research-tutored) rather than at the bottom half (research-oriented and research-led). However, in much of higher education too much teaching and learning occur at the bottom half. Jenkins and Healey (2009) support that the four different ways used to engage students with research may join together, that is, they may interconnect to one another throughout a curriculum design and teaching practices. For instance, in a research-based curriculum students may undertake research and enquiry activities and then the students may do research discussions as one of the main activities emphasised by the

research-tutored. In turn, research discussions may be used as a way of learning about current research in the discipline as an activity mostly focused in a research-led curriculum. Likewise, learning about current research in the discipline may enhance research skills and techniques as the main activities emphasised by a research-oriented curriculum. However, the authors consider that it is a big challenge on how to design a [curriculum] in which the elements of the four ways of engaging students with research join together. This study was aware of the interconnections between the four different ways of engaging students with research. Nevertheless, the study was more concerned with the frequency of using one of the four ways of engaging students with research in attempt to find out whether they were interconnected or not in a curriculum design and teaching practices.

In short, the relationship between teaching and research through curriculum designs, namely research-based, research-tutored, research-oriented or research-led is influenced by the types of activities undertaken in each curriculum as well as the roles played by both the lecturer and student. However, this underlies teaching methods for integration of teaching and research. Thus, the next section discusses how the teaching methods in a curriculum can help to integrate teaching and research in higher education.

2.3.4 Teaching methods for integration of teaching and research in higher education

Tight (2003) states that in order to foster the integration between research and teaching as well as learning in higher education, it is necessary to take into consideration teaching methods employed and how these methods are used effectively in the process of teaching, [research] and learning. Simultaneously, it is essential to understand students' approaches to learning such as deep and surface approaches. In this case, students who employ surface approach to learning try to memorise knowledge in order to pass a given test or task. In contrast, students who apply deep approach to learning seek to understand what is studied in a critical way and build new knowledge. In this view, a deep approach rather than a surface approach to learning can strengthen the integration between research and teaching in higher education. Kember (1997) quoted by Ozay (2013) argues that teaching has

different conceptions such as teacher-centred [method] and student-centred [method]. The teacher-centred [method] consists of transmitting information or structure of knowledge to students and the interaction between the lecturer and students is through apprenticeship in which the lecturer plays a role of a master and students play a role of a passive learner. Consequently, this method of teaching leads to surface learning, for example, reproduction or memorisation of knowledge through rote learning. On the contrary, the student-centred [method] consists of teaching as facilitating understanding of knowledge and taking into consideration conceptual change, that is, learning that encourages the change of an existing conception of knowledge or intellectual development. In addition, the student-centred [method] focuses on deep learning, for example, critical thinking and the use of scholarship. In this way, the student-centred [method] may enhance the integration between teaching and research in higher education as it involves meaningful learning.

Helle, Tynjälä and Vesterinen (2006) defend that learning is experiential, that is, reflective and self-directed from the humanistic perspective. In this view, the student-centre method underlying deep approach to learning discussed earlier can motivate students to use their life experiences to understand knowledge. The authors maintain that learning can involve cognitive constructive and social cultural perspectives. The former can help students to integrate theoretical knowledge into practice and the latter can lead to interaction among members in the academic community of practice. In turn, this kind of learning may foster scholarship of application as well as scholarship of teaching and learning discussed previously as one of the ways of linking teaching and research in higher education. Brasov (2007, p. 68) asserts that "the main position of [higher] education today is constructivism which is based on the conception that learners actively raise their own knowledge on the foundation of prior experiences and knowledge, we need to move from content and product… to the process of doing research." This assertion implies that students may construct knowledge in higher education, but this depends on the teaching methods and activities employed in the teaching and learning process. For example, the student-centred method underlying research-based activities such as research projects may help students to create new knowledge, as a consequence, this can enhance the link between research and

teaching in higher education.

Smith et al. (2007) advocate that the process of knowledge creation can be stimulated by enquiry-based learning which encompasses many different elements such as learning driven by enquiry, that is to say, by questions or problems, learning centred on understanding the process of knowledge and creation of new knowledge, learning approaches to teaching in which the lecturer plays a role of a facilitator, learning that is self-directed, that is, independent learning in which the students take accountability for their learning and give feedback on the development of the skills obtained throughout learning and this suggests an active approach to learning. Meanwhile, this kind of learning should coexist with the student-centred method discussed earlier in attempt to integrate research and teaching in higher education. Lambert (2009, p. 304) points out that "research-based learning has the potential to situate undergraduate students at the heart of university as producers rather than consumers. In turn, this entails…student experience which favours dialogic over explicative pedagogies…." This suggests that research-based learning should focus on research activities, for instance, research projects that can foster students in higher education to produce new knowledge rather than only consumers of knowledge. If students produce new knowledge through research-based learning, the link between research and teaching can be strong.

Elsen et al. (2009, p. 73) say that "there are various ways to conceptualise the link between research and teaching. These ways can be distinguished according to the role of the students (for example, to what extent do students engage in research activities?) and by an emphasis on either research content, or research processes and problems." This suggests that teaching methods such as the student-centred method and the teacher-centred method influence the link between research and teaching in different ways. In this case, the student-centred method in which students play an active role in the teaching-learning process may increase the link between research and teaching since students learning through research-based activities such as research projects while the teacher-centred method in which students are passive receivers of the knowledge transmitted by the lecturer may decrease the link between teaching and research in higher education. Despite some attempts to establish research-based

learning with the three dimensions of curriculum designs identified by Healey (2005) in figure 3, it can be seen that students do not benefit from research-based learning in all the dimensions. For example, a research-based curriculum is potential for students to benefit from research-based learning since it underlies a student-focused method (student-centred method) in which students have to learn through research-based activities. A research-tutored curriculum involves a student-focused method in spite of emphasising research content. In this case, the research-tutored curriculum emphasises on research content in the sense that it is concerned with writing and discussion of essays or papers as the content pre-determined in the curriculum. However, the activities undertaken in the research-tutored may help to link research and teaching in higher education since students may develop skills in writing and reviewing academic work such as papers for publication. Whereas, a research-oriented curriculum emphasises on research processes and problems in the discipline. In addition, the research-oriented curriculum is concerned with learning of research processes for knowledge construction in the discipline being taught and it uses problem-based learning (PBL). This implies that the research-oriented curriculum focuses more on the teacher-focused methods rather than the student-focused method in attempt to link teaching and research.

Finally, a research-led prospectus emphasises on learning about others' research and content knowledge in the discipline. According to Prince, Richard and Brent (2007, p. 289), "content knowledge [refers] to knowledge of the facts, principles and methods in the discipline that is being taught." This suggests that the research-led curriculum focuses on the conceptual knowledge in a single discipline, but this knowledge is not integrated within a discipline and other disciplines through research and scholarship discussed previously. According to Griffiths (2000), research-led course contents are centred on the lecturer's research interests and the contents are taught through teacher-focused method in the form of lectures. In this way, the research-led curriculum can weaken the integration of teaching and research in higher education because students are not engaged in research-based learning as a result of the teacher-focused method employed in the process of teaching and learning. By way of comparison, there is a similarity between the research-led curriculum and the

research-oriented curriculum. According to Jenkins and Healey (2005) the common element between the research-oriented curriculum and the research-led curriculum is the employment of the teacher-focused method in which the lecturer plays a role of knowledge transmitter and the student plays a role of a receiver of the knowledge transmitted by the lecturer. By contrast, the research-oriented curriculum underlies PBL. Savin-Badan (2000) explains that PBL is used to foster skills of students in solving problems. In PBL, students rely on the information supplied by the lecturer to solve the problems and solutions to problems are determined by the content being learned in the boundary of the discipline. As a consequence, students explore more knowledge content which develops know-how skills in the specialised area of study. Even though PBL is regarded as teacher-focused, in my view, I consider it as employing both teacher and student-focused methods because after the input provided by the lecturer, the students can actively participate in discussion or research in attempt to find out possible solutions to the problem according to their previous knowledge and/or experience in order to integrate teaching and research in higher education.

Overall, a nexus of research and teaching in higher education may be strengthen or weaken by the employment of the student-centred method or teacher-centred method respectively in a curriculum design and practices. A curriculum design using the student-centred method involving research-based activities may encourage enquiry-based learning leading to strong integration of research and teaching while a curriculum design consisting of the teacher-centred method that mostly includes lecturers and learning about others' research can lead to poor integration of teaching and research in higher education. The next section discusses the relationships between research and teaching.

2.4 A mutual relationship between research and teaching

This section attempts to establish a mutual relationship between research and teaching and the section is divided into three sub-sections. The first sub-section discusses the association between research and teaching while the second sub-section discusses the correlation between research and teaching. Finally, the third sub-section analyses de conditions that facilitate or discourage the integration between teaching and research.

2.4.1 Association between research and teaching

Colbeck (2002, p. 43) states that "teaching is variously described as the processes of preparation, classroom-instructions, grading and advising; products such as new courses developed...as college or university goal. Research may refer to the processes of gathering and analysing data or securing funding; to publication, grant, or patent products or to institutional goal." Although research and teaching have different descriptions, there is a relationship between them. According to Rowland (2005) the relationship between teaching and research may be established through the process of enquiry. This means that both teaching and research rely on the environment of enquiry in order to relate to each other. For example, teaching instruction may be provided in the environment of enquiry. At the same time, research outcomes such as publication may be developed and scholarly disseminated in the environment of enquiry. In this case, the environment of enquiry may not only foster the interaction between research and research but also it may develop and strengthen their relationship.

For Eindhoven (2007), the relationship between research and teaching is based on knowledge exchange, even so, research and teaching have main different functions. Research functions as the generation of new knowledge while teaching functions as the preparation and dissemination of existing or new knowledge in society. In this context, research functions as 'production process' of knowledge, whereas, teaching functions as the 'marketing' of knowledge. James (2010, p. 38) argues that "teaching may enhance research. It can provide a direct stimulus in the generation of new ideas as well as data that can contribute to further research. Teaching a subject may clarify thinking and the ability to explain a topic... to appreciate the subject as a whole and to link research into related areas." This means that teaching may trigger research. For example, during the teaching process, questions or problems may be raised by both lecturers and students as researchers in attempt to find out additional answers or further solutions to the problems that have already been investigated by other researchers.

Elton (2005, p. 138) postulates that "the potential nexus between research and teaching is... primarily... associated process rather than outcome." This implies that a

positive nexus between research and teaching may result from interaction process of both research and teaching instead of their products. According to Gibbons (1997) many processes may be involved in the interrelation between research and teaching. These processes include transmission links, the process link and the research culture link. In the process transmission link, teaching is a way of transmitting new research knowledge, that is, a research-teaching link. Meanwhile, the research process may be informed and enriched through involvement in teaching, that is to say, a teaching-research link. The process link consists of encouraging students' involvement in enquiry-learning approaches which may motivate students to do research. Finally, a research-culture link in which learning occurs in a community of enquiry where both lecturer and students work together, as a result, this may help to strengthen the link between research and teaching in higher education.

Prince, Richard and Brent (2007) argue that research can potentially support teaching so there is a relationship between the two activities. The authors sustain that research supports teaching through scholarship. Boyer (1990) classifies scholarship into scholarship of discovery, scholarship of integration and scholarship of application as well as scholarship of teaching and learning. Boyer states that the scholarship of discovery is concerned with the questions of what is to be known or found, while, the scholarship of integration is related to the meaning of research findings, that is to say, the interpretation and appropriate contextualisation of research findings. Consequently, the investigative and synthesising traditions of academic life may be reflected in the scholarship of discovery and integration. Whereas, the scholarship of application is concerned with the interaction of theory and practice in which theory revives practice and vice-verse. Finally, the scholarship of teaching and learning is associated with academic knowledge of the teacher in his or her field of study and how this knowledge can be intellectually involved in the process of teaching and learning effectiveness through a student-focused approach. Healey and Jenkins (2011) provide some examples of ways in which learners may engage with Boyer's four types of scholarship (see table 1 next page).

Table 1: Boyer's four types of scholarship and their respective engagement with students

Types of scholarship	Illustrative examples of ways of engaging students
Scholarship of discovery	Engage in enquiry-based learning, undergraduate research and consultancy.
Scholarship of integration	Engaging in integrating material from different sources, including across discipline, integrate life and work experience with academic studies; reflection on implications of the study for personal development.
Scholarship of application	Engage with local, national, and international community service projects, volunteering; knowledge or engagement in exchange projects; applied knowledge and skills in work-based placements.
Scholarship of teaching and learning	Engage in mentoring, peer support and assessment; collaborative group work; learners as explicit partners in educational development and enquiry.

Source: Jenkins and Healey (2011).

Integration of scholarship may help to establish the relationship between teaching and research in higher education as Prince, Richard and Brent (2007) sustain that scholarship may improve instruction, for example, it may lead to the current course contents or raise students' intellectual curiosity and critical thinking which are the main characteristics of research. The author maintains that there is an association between teaching and research that underlies on their complementarities although many studies have failed to show the correlation between research productivity and teaching performance. Jenkins (2003, p. 4) states that "the link [between research and teaching] does not occur automatically; it has to be designed, created, constructed, contrived, [and] 'brought about'…." This statement suggests that for establishing of

the relationship between research and teaching may depend on how narratives such as academics conceptualise research and teaching beyond a disciplinary space. This means that the concept of research and teaching beyond a disciplinary space may foster lecturers to design enquiry-based curricula and use student-centred approaches that may help them create or construct their knowledge under the assistance of the lecturer as a facilitator.

Brew (2010, p. 148) emphasises that "integrating research and teaching requires academics to think about what they mean by teaching and...; to reconsider what they think research is and ideas about who generates it.... Definition and conceptions of teaching, of research of knowledge and of scholarship need to be expanded." This means that the concepts of teaching, research, knowledge and scholarship should be reassessed in order to include a wide range of elements that may help to link research and teaching in higher education. Healey (2005) supports that different ways to link research and teaching reflect in different approaches to teaching. For example, student-focused approaches emphasise more on active participation of students in the class where the students are responsible for constructing new knowledge. In contrast, teacher-focused approaches give more attention on transmission of knowledge and assign a passive role to the students in the class. Currently, research is no longer regarded as pure and disciplinary based so it is context specific and multi-disciplinary with social relevance. Scholarship is not any more considered as discovery. According to Healey and Jenkins (2014) there are different types of scholarship beyond discovery namely scholarship of integration, scholarship of application and scholarship of teaching which may function in an integrative way. Hughes (2005, p. 64) adds that "it is also important to consider what kind of research is being compared with teaching. If research is defined as a quasi-industrial process of systematic enquiry, the links with teaching may be more difficult to establish than if research is defined in more open and imaginative terms within the broader canvas or framework of academic work." This suggests that research should not be defined narrowly as discovery and production process of new knowledge. Research as an academic activity is beyond discovery and new knowledge production. In other words, research as an academic activity should not only rely on traditional scholarship of discovery

and knowledge production but also it should rely on other types of scholarship such as scholarship of integration, scholarship of application and scholarship of teaching depending on the kind of research to be conducted.

2.4.2 Correlation between research and teaching

Many studies have been conducted in attempt to establish a correlation between teaching and research, nonetheless, the studies have found a lack of correlation between teaching and research. Robertson (1991, p. 1) asserts that "many attempts have been made to correlate teaching and research. However, most studies use quantitative measures, such as students' evaluations and publication counts to focus on the relationship between the effectiveness of teaching and productivity of research. The use of such measures may be producing ambiguous results." This assertion means that the correlation between teaching and research has been established through the product or outcome of research and teaching rather than their process, as a consequence, the correlation between teaching and research is interpreted as an objective process rather subjective and construction process.

> *Evidence of teaching productivity might include number of courses and student taught, number of advisees (including graduate students who have completed degrees), summary scores of student ratings of instruction, a brief description of new courses developed. [However,] faculty provide evidence of research productivity with information about manuscripts accepted in press, or published; grants or awards received; conference paper presented; or performance given (Colbeck, 2000, p. 45).*

Halliwell (2008, p. 3) points out that "in many instances the correlation [between teaching and research is] sought in regard to the effect of individual's research product.... rather than an understanding and sharing of the nature of the research process." This suggests that the understanding of research and teaching as a product or outcome rather than a process may hinder their correlation because research and teaching are not considered as interdependent constructs that can be developed through a process of scholarship.

Hughes (2004, p. 4) claims that "there is little empirical evidence to support the assertion about research and teaching relationships." This claim suggests that more studies should be conducted in order to find out some evidence concerning with the relationship between teaching and research.

> *Results from the meta-analysis of 58 studies conducted by Hattie & Marsh (1996) are unsurprising given the fact that, in general the study included in the meta-analysis defined the relation between teaching and research only in terms of effectiveness and productivity. They used simple quantitative measures such as student ratings and publication counts (Robertson 1999, p. 3).*

Robertson and Carol (2005, p. 89) assert that "for academics who experience the relation [between teaching and research] as symbiotic or integrated, knowledge does not exist 'out there' waiting to be discovered. Rather, it is socially de/constructed in a dialogic relationship with a scholarly community..." This assertion implies integration of different scholarship in which knowledge is constructed or deconstructed by academics and students during the research-teaching process.

Rowland (2005) claims that the weaknesses of a culture of enquiry are more likely to be the obstacle which hinders the correlation between effective teaching and effective research. Rowland notes that the connection between teaching and research may result from a culture of enquiry in which scholarship is considered as a way to build a deep and critical understanding of disciplinary as well as interdisciplinary knowledge. Robertson (1999, p. 3) says that "the literature dealing with the relation between teaching and research in higher education is both complex and contradictory." In this context, some literature argues that there is a relationship between teaching and research. However, other literature maintains that there is no relationship between teaching and research. Healey (2005, p. 76) states that "some of the controversy about the research-teaching nexus is due to differences in the way the term research and teaching.... are used. Generally it is easier to develop the linkage the more acceptable it is to use the form flexibly to include the wide range of forms." The wide range of forms that may allow the term research and teaching to be flexibly used are different

kinds of scholarship that have been discussed earlier.

Brew (2006, p. 170) postulates that "how academics view research [and teaching] influence how they believe research and teaching can be brought together... there is a need to extend the range of ways individual academics consider integrating their research and their teaching..." This implies that research and teaching should be reconceptualised beyond the traditional view in which research and teaching are aimed to discovery new knowledge and transmit knowledge respectively. In other words, research should not only be regarded as discovery of new knowledge but also integration and application of knowledge. At the same time, teaching should not only be regarded as transmission of knowledge but also as a way of helping learners to be actively involved in construction and/or deconstruction of knowledge in attempt to integrate research and teaching in higher education.

2.4.3 Conditions facilitating or discouraging the integration between teaching and research

Jenkins and Healey (2009) postulate that the engagement of undergraduate students in a variety of research and enquiry projects from the beginning of their study in higher education may help to link research and teaching rather than leaving the experience of doing research or capstone projects to the final year. Brew (2009) argues that students' awareness of research should be considered as a critical factor to link research and teaching in higher education. For example, research-based learning may not be exploited if students have negative attitudes or they are not aware of university as a research setting. Similarly, another critical factor which may enhance teaching and research is a curriculum design involving students in a variety of research-based activities and induct them in the research community in which both lecturer and students do research together.

Jenkins, Healey and Zetter (2007, p. 3) state that "disciplinary differences colour not only both research and teaching, but also their relationship, in quite distinctive way. Furthermore, departments are where both research and teaching are formulated, carried out and discussed and therefore the seabed for nurturing research-teaching relationships." This assertion suggests that a discipline or department can influence

the way of integrating research and teaching in higher education. Robertson (2007, p. 113) states that "academics' epistemologies are not only strongly influenced by the way knowledge is conceived of and structured within their discipline but...these epistemologies play a fundamental role in shaping experiences of research, teaching and learning [activities]... and [how these activities are] experienced and enacted." This statement implies that academic discipline has its own knowledge structure as well as methods and approaches of teaching, research and learning and this influence the way of integrating research and teaching. According to Brew (2009) integration between teaching and research seems to be easier in disciplines where knowledge is diffuse (not concentrated), where curricula are idiosyncratic and where academics work more independently rather than in disciplines which involve a high degree consensus of the content of the curriculum and much research collaboration. For example, in hard disciplines, such as engineering, knowledge is concentrated. Thus, the organisation of knowledge in curriculum designs may be more hierarchical in the hard disciplines rather than soft disciplines like humanities in which knowledge is diffuse.

Lambert (2009, p. 68) says that "... [Factors such as] management strategies and pressures from accountability and funding mechanism [lead] to compartmentalisation of teaching and research. For instance, universities often value research more (that is, career perspectives)... at the same time the facilities to do research (especially time) are limited [due to] higher teaching demands." In this way, higher education institutions may become predominately-teaching institutions although they might have a mission to integrate both teaching and research in higher education. Elton (2005, p. 118) asserts that "[in] the mass university of today... teaching appears to be largely a matter of preparing students for the job market and research is so specialized than even within a single discipline, researchers may have little to say to each other." This assertion suggests that mass higher education institutions or institutions with a large number of students have faced difficulty in linking research and teaching as they focus more on discipline specific competence required for the labour market. In this case, students are only trained to learn by doing the job required for the labour market, as a result, the main aim of this kind of learning is to apply knowledge that

has already been produced, but students may not understand the process of its production in order produce other knowledge. The next section provides the summary of the literature review of the study.

2.5 Summary of the relationship between teaching and research in higher education

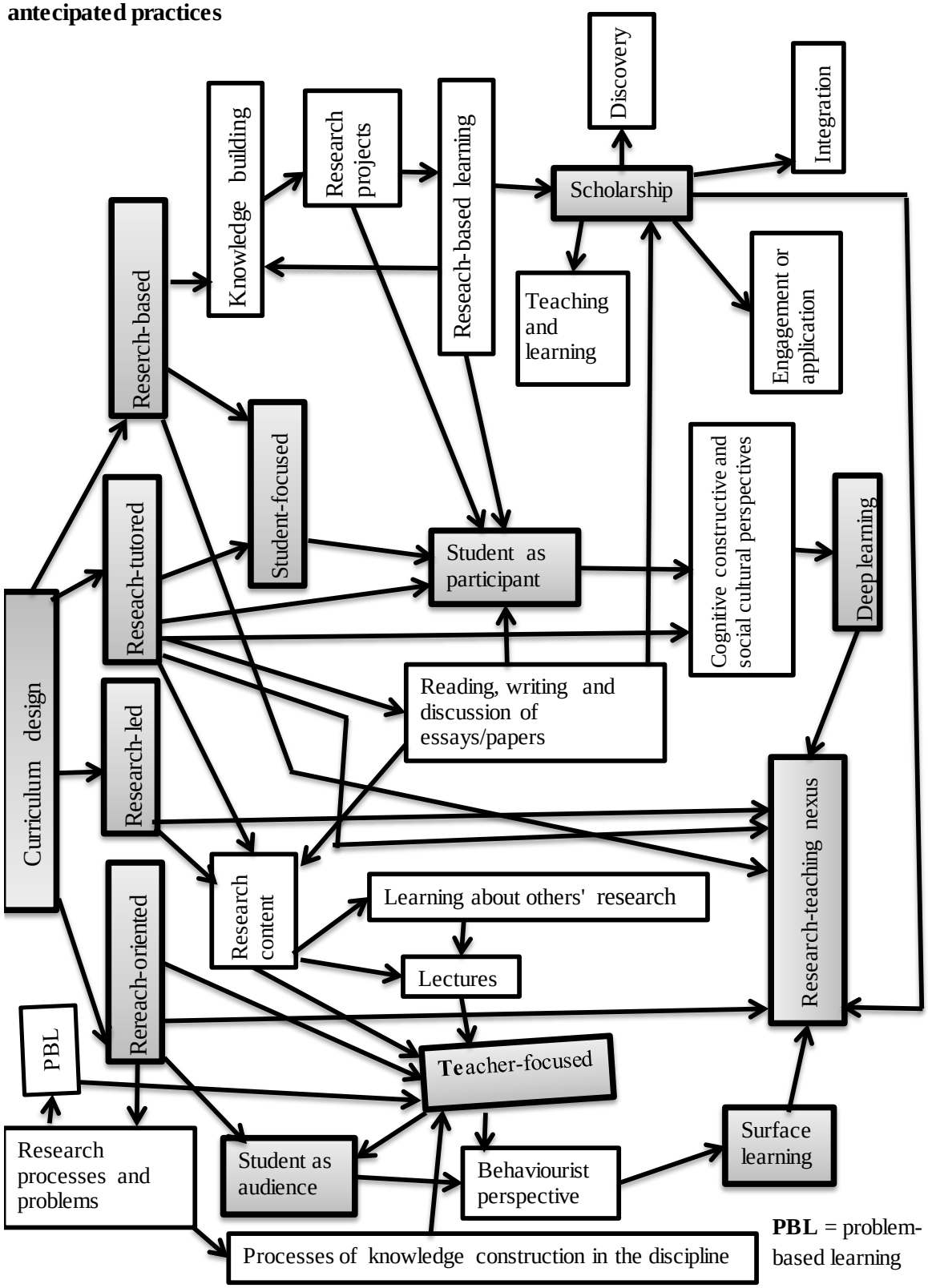
This section is concerned with the summary of the relationship between teaching and research in higher education. To summarise, the literature reveals that the relationship between teaching and research is controversial. Some authors argue that there is a relationship between teaching and research and this relationship is reflected in the process of enquiring for both teaching and research. For example, teaching may enhance research since it provides direct stimulus in the generation of new ideas as well as data that can contribute to further research. Meanwhile, the relationship between teaching and research is associated process rather than outcome and this relationship is supported by the combination of different scholarship, namely scholarship of discovery, scholarship of integration, scholarship of application and scholarship of teaching and learning. However, others maintain that there is no relationship between teaching and research because teaching productivity (e.g. number of course taught and summary scores of students' ratings of instruction) is different from research productivity (e.g. publication counts and awards received). Nevertheless, this argument is based on quantitative measures of what teaching and research produce rather than their association process. In my view, I agree with the authors who sustain that there is a relationship between teaching and research activities as far as the interaction process of these activities is concerned rather than their productivity. Interaction process between teaching and research may be reflected in the learning environment in which teaching can trigger research. For example, in the student-focused method to teaching in which both teacher and students are learners and researchers may raise questions or problems for research in attempt to find out their answers or solutions so this can help to establish a two-way interaction and relationship between teaching and research. The process that involves the interaction between teaching and research in the learning environment is discussed through a conceptual framework in the next section.

2.6 Conceptual framework of the study

This section is related to the conceptual framework of this study and it was based on the literature review discussed earlier. As stated previously, the purpose of this study was to understand how the teaching staff at UEM establish a link between research and teaching through curriculum designs and teaching practices and analyse the effectiveness of teaching methods used by the teaching staff to integrate research and teaching in higher education.

The conceptual framework of this study attempted to show how a curriculum design could establish a link between research and teaching in higher education. According to Healey (2005) a curriculum can be research-based, research-tutored, research-oriented or research-led and a curriculum can develop research-teaching nexus in three dimensions. The first dimension is concerned with a curriculum that treats students as participant or audience. The second dimension is related to a curriculum that the methods of teaching can be the student-focused or teacher-focused. The third dimension consists of a curriculum that emphasises on research content or research processes and problems (see figure 4 next page).

Figure 4: Conceptual framework of research-teaching nexus in a curriculum design and antecipated practices



PBL = problem-based learning

In the literature review, I have found concepts that may help to understand how research and teaching can be established. In this context, I have designed a conceptual framework in order to show different concepts that can be used to develop the research-teaching nexus in different ways (see figure 4 on the previous page). In figure 4, the key concepts involved in the development of a nexus between research and teaching entail research-based, research-tutored, research-led, research-oriented, student-focused, student as participant, scholarship, deep learning, teacher-focused, student as audience, and surface learning. I have used these key concepts and other concepts mentioned in the conceptual framework in attempt to show how they are related to the research-teaching nexus.

Figure 4 shows that the relationship between teaching and research occurs in the context of a curriculum design. In this case, a curriculum can be research-based, research-tutored, research, led, or research-oriented. Research-based is linked with the research-teaching nexus through student-focused method of teaching in which the students are active participants in the teaching-learning process. In this way, students are engaged in research-based learning which entails knowledge building through research projects. Likewise, research-based learning involve different kinds of scholarship namely scholarship of discovery, scholarship of integration, scholarship of engagement or application, as well as scholarship of teaching and learning discussed throughout the literature review. Scholarship may help to link research and teaching. At the same time, research-based learning involves cognitive constructive and social cultural perspectives which lead to deep learning discussed in the literature review. In turn, deep learning may foster the link between research and teaching.

The research-tutored is linked to the research-teaching nexus through the student-focused method of teaching in which students participate actively in the process of teaching and learning. In the research-tutored students read, write and discuss essays or papers in the context of scholarship as well as cognitive constructive and social cultural perspectives discussed throughout the literature review. The research-tutored tightly emphasises on research content pre-determined by the curriculum in the environment of reading, writing and discussion of essays and papers.

The research-led is linked to the research-teaching nexus through the teacher-focused method of teaching in which the lecturer transmits knowledge to students and the students are audience, that is, passive receivers of knowledge transmitted by the lecturer. Furthermore, the research-led heavily emphasises on research content pre-determined by the curriculum. In this case, students mostly learn about others' research in the context of the discipline through lectures based on the teacher-focused method. This method underlies a behaviourist perspective which leads to surface learning as a way of establishing the research-teaching nexus.

Finally, the research-oriented is linked to research through the teacher-focused method of teaching discussed in the literature review. The research-oriented emphasises on research-processes and problems, which entails problem-based learning as well as learning about construction of knowledge in the discipline also discussed in the literature review. Learning about the processes of knowledge construction in the discipline and problem-based learning are teacher-focused activities that underlie a behaviourist perspective to learning. This results in surface learning as way of establishing a nexus between research and teaching.

In short, the conceptual framework of this study provides many different concepts that may help to understand how a nexus between research and teaching can be developed in different curricula, specifically research-based, research-tutored, research-oriented and research-led as well as their respective teaching practices. Meanwhile, the conceptual framework of this study should be considered as a tool that helped to select appropriate research methods for the study discussed in the next chapter which is related to the research design and methodology.

CHAPTER 3 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The chapter 3 gives an overview of the research approach and discusses four different research methods that this study used for data collection. The study employed a mixed method enquiry approach for data collection, which entailed a combination of quantitative and qualitative research methods in order to increase the quality of the data for the study.

3.2 Research approach

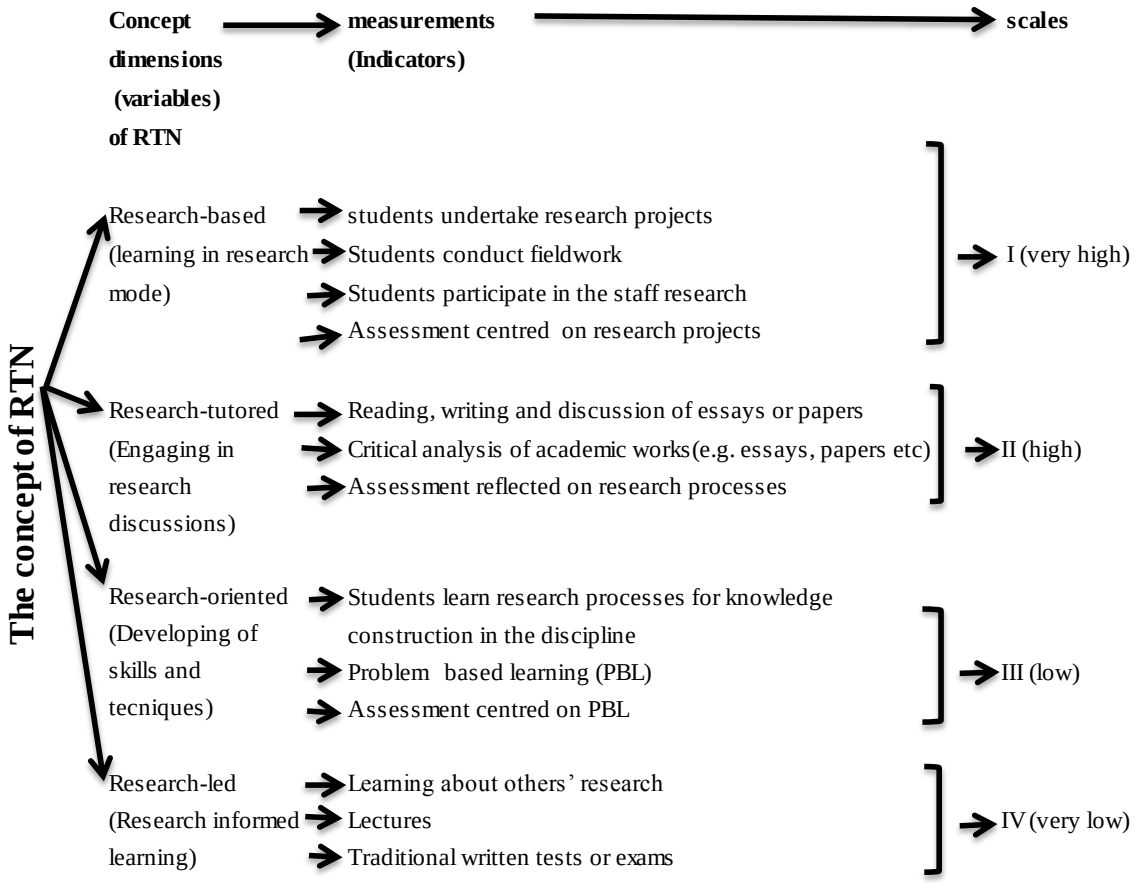
The main aim of this study was to understand how the teaching staff at UEM link research and teaching through the curriculum designs and their teaching practices. In this context, I used a mixed method enquiry approach to examine the linkage between research and teaching at UEM from different sources. Creswell (2009) states that a mixed method research is the combination of both quantitative and qualitative research methods in a research study. Dahlberg and McCaig (2010, p. 27) argue that "The researcher can start by using qualitative methods to generate hypotheses...[to] be tested in a quatitative follow-up study and data gathered...[for] generalisations....[Or] to start with a quantitative study to generate data and then carry out a qualitative study to explore deep meanings." In this study, the mixed method approach for data collection followed a sequential (phased) exploratory strategy of two phases which first entailed a phase of qualitative data collection for an exploratory purpose of the research topic followed by a second phase of quantitative data collection. In this context, I used a sequential exploratory strategy so that quantitative data and results could assist the interpretation of qualitative findings.

I employed data and information from qualitative research methods as a basis for designing quantitative research methods for data collection in the second phase. Then, I mixed the data by interconnection between the qualitative and quantitative data analysis. However, I placed weight on the first phase as I wanted to understand the research-teaching nexus from the experiences, beliefs and points of view of research participants.

3.3 Dimensions of the concept research-teaching nexus

This study was based on the concept of the research-teaching nexus. Meanwhile, for a better understanding of this concept, I have divided it into four dimensions (variables) namely research-based, research-tutored, research-oriented or research-led teaching and learning as well as their respective measurements or indicators and scales (see figure 5 below).

Figure 5: The concept of research-teaching nexus (RTN) dimensions (variables), measurements (indicators) and scales



Source: Adapted from Giller (2011)

Figure 5 shows that the measurements or indicators of the research-based consist of students undertaking research projects and fieldwork, participating in the staff research and being assessed on research projects. While the measurements or

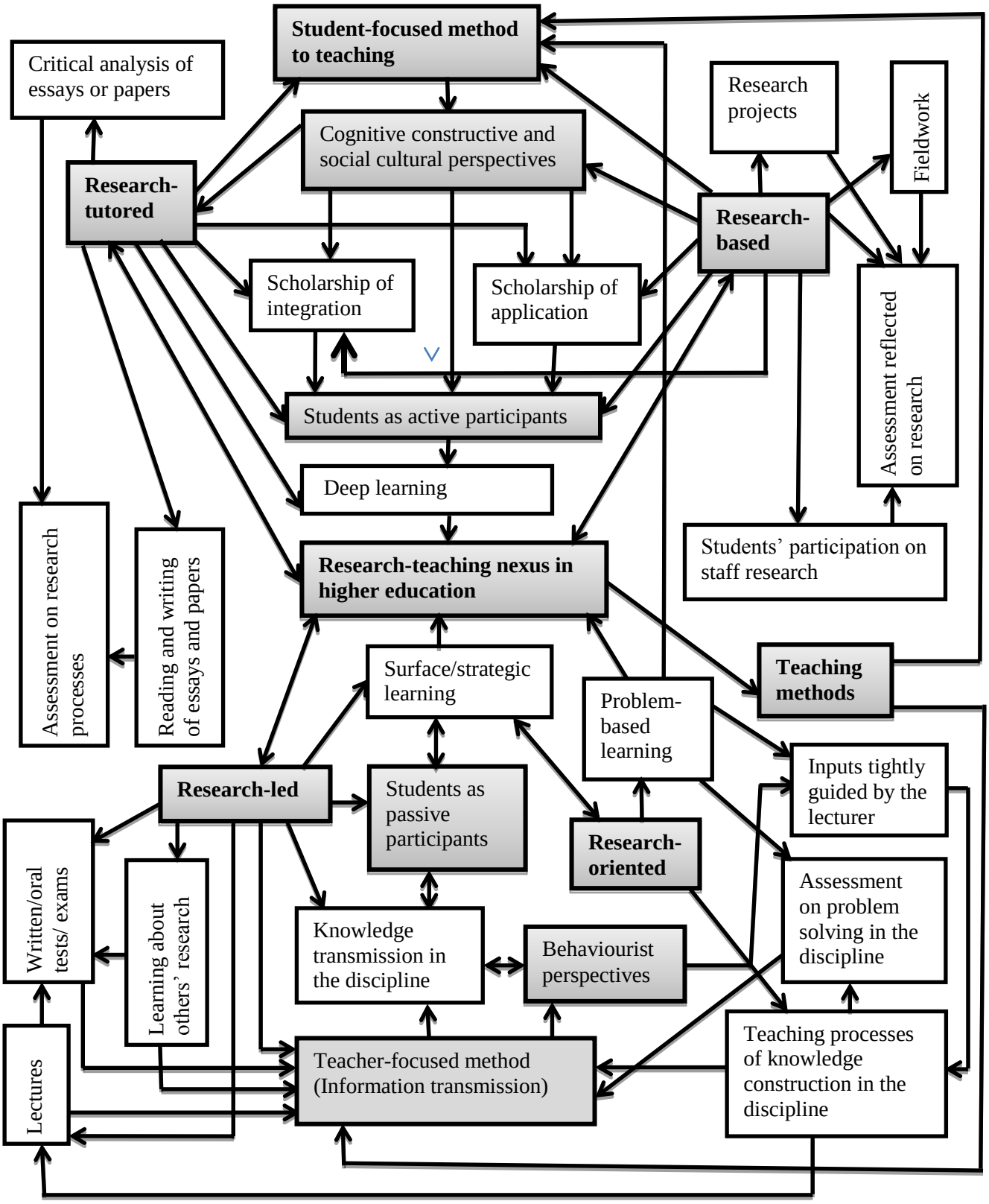
indicators of the research-tutored involve students reading, writing and discussion of essays or papers as well as critical analysis of academic works and assessment on research processes. At the same time, figure 5 shows that the measurements or indicators of the research-oriented entail students learning research processes for knowledge construction in the discipline, PBL and assessment on the PBL. Finally, the measurements or indicators of the research-led include learning about others' research, lectures and traditional written tests or examinations.

Figure 5 demonstrates that the measurements or indicators of the concept dimensions (variables) of the research-teaching nexus mentioned earlier are brought together through scales ordered from I (very high), II (high), III (low) and IV (very low). In this case, the indicators or measurements of the research-based and research-tutored form scales I and II respectively. Likewise, the indicators or measurements of the research-oriented and research-led form scales III and IV sequentially.

3.4 The analytical framework of the study

The analytical framework of the study is concerned with assumptions of research-teaching nexus and their relationships for developing a nexus between research and teaching in higher education (see figure 6 next page).

Figure 6: Analytical framework of the study



This study is centred on the concept of the research-teaching nexus. As can be seen in figure 6 on the previous page, the concept of research-teaching nexus has four dimensions (variables), namely research-based, research-tutored, research-oriented and research-led. In this context, research-based and research-tutored rely on the student-focused method to teaching and learning. This method involves cognitive constructive and social cultural perspectives for learning.

According to Helle, Tynjälä and Vesterinen (2006) a cognitive perspective for learning helps students to integrate theory and practice in the learning process. Whereas, a social cultural perspective for learning gives possibilities for students to interact with different types of scholars or professionals in different fields in order to improve interdisciplinary skills. Cognitive constructive and social cultural perspectives for learning underlie scholarship of integration and scholarship of application.

Scholarship of integration helps students to integrate their knowledge from different sources beyond the discipline while the scholarship of application helps students to apply knowledge and skills, that is, theory and practice in real life situations. In the student-focused method, the students participate actively in teaching-learning process (Jenkins and Healey, 2011). This method implies research activities since they create deep learning. This type of learning may help to link research and teaching in higher education.

The research-based is student-focused and has common indicators such as students undertaking research projects and fieldwork as well as students' participation on staff research projects and their assessment centred on research projects. Similarly, the research-tutored is student-focused and consists of indicators such as reading, writing and critical analysis of academic essays and papers as well as assessment of students on research processes.

The research-oriented focuses on teaching processes of knowledge construction in the discipline as well as PBL. Knowledge construction in the discipline is based on the teacher-focused method (information transmission). This method underlies

behaviourist perspective for teaching and learning in which the lecturer transmits disciplinary knowledge to students through lectures. As a result, the students play a passive role in teaching learning process and this role leads students to do surface or strategic learning which implies reproduction of knowledge or rote learning respectively. The teacher-focused method consists of lectures and written or oral tests/examinations as the main indicators. In contrast, the research-oriented curriculum focuses on PBL in which the assessment is centred on problem solving activities in the context of the discipline. On the one hand, PBL underlies a teacher-focused method to teaching and learning because the input is tightly provided by the lecturer. In this case, the lecturer provides inputs such as problem scenarios for students to discuss and find possible answers or solutions. On the other hand, PBL is student-focused activity since the students use cognitive constructive and social cultural perspectives for learning discussed earlier. The former helps students to integrate theoretical knowledge into practice through problem solving activities. The latter helps students to interact with different types of knowledge sources in their area of the study or other areas in order to improve interdisciplinary skills. Cognitive constructive and social cultural perspectives for learning involve scholarship of integration and scholarship of application discussed earlier. In this case, in a PBL activity, students are active participants since they are engaged in problem solving of real life problems resulting in deep learning that may help to link teaching and research in high education.

Finally, research-led focuses more on the teacher-focused method (information transmission) to teaching and learning. This method underlies behaviourist perspectives to teaching and learning which implies one-way interaction between teacher and students. In the teacher-focused method, lectures are the main vehicles used by the lecturer to transmit knowledge to students. Consequently, the students play a passive role in the teaching-learning process leading them to do surface or strategic learning. The research-led curriculum has common indicators such as learning about others' research, lectures, traditional written tests or examinations throughout the course.

In short, the analytical framework of the study provided variables and attributes of the

research-teaching nexus that were used as a guide for data collection and analysis.

3.5 Research design

The study employed a case study as a research design. Yin (2003) classifies case studies into two types: a single case study and multiple-case studies. A single case study involves a single case only while multiple-case studies consist of two or more cases about the same study. Meanwhile, on the basis of their application, a single case study and multiple-case studies can be exploratory, descriptive, or explanatory (causal). In this case, an exploratory case study is employed in order to draw the research questions or hypotheses and decide on the appropriate research procedures. Whereas, a descriptive case study is concerned with a full description of the problem under studied in a given context. Finally, an explanatory case study focuses on causal explanation of the phenomenon under studied. In this view, this study employed a single case study in combination with exploratory, descriptive and explanatory elements described earlier in order to understand how the teaching staff integrate research and teaching in the research setting. According to Bryman (2012, p. 708) a case study may be defined as a "detailed and intensive analysis of a single case [or] two or three cases for comparative purposes." Meanwhile, this research was concerned with a single case study of UEM. The purpose of studying the case of UEM was to obtain a profound and detailed understanding on how the teaching staff bring research and teaching together in the scope of the curriculum designs and teaching practices.

The case study involved a sequence of different research methods, namely a qualitative semi-structured interview, a qualitative documentary analysis, a quantitative structured observation and a quantitative questionnaire that were discussed later in this chapter. I employed the four research methods so that it would be possible to address different issues of the research questions in order to find their possible answers. Likewise, I used the four research methods in the sense that they could complement one another in the data collection, analysis and interpretation of findings. Furthermore, I used the four research methods so that they could give quality and validity to the study.

The research design followed the analytical framework of the study depicted in figure 6 (see page 39). As stated earlier, the study is centred on the concept of the research-teaching nexus. Meanwhile, for a better understanding of this concept, I have divided it into four dimensions (variables) specificallyresearch-based curriculum, research-tutored curriculum, research-oriented curriculum and research-led curriculum. The dimensions have their respective measurements (indicators). In figure 5 (see page 37), I have shown scales of indicators for four curriculum dimensions. I have also stated earlier that I used different research methods for data collection specifically an interview, a documentary analysis, an observation, and a questionnaire in order to understand the concept of the research-teaching nexus in a comprehensive way.

First, I used the interview so that I could have deep understanding about how lecturers and students make use of the indicators of the four curriculum designs identified in figure 4 (see page 33) in order to link research and teaching in higher education. Second, I used the documentary analysis so that I could have detailed understanding about how lecturers in the research setting link teaching and research in the view of the curriculum designs distinguished in figure 4. Third, I used the observation to understand the teaching practices suggested by the teaching methods (the student-focused method and/or the teacher-focused method) used by the lecturers in the classroom to link teaching and research. In the classroom, I observed the types of interaction between the lecturer and students and the interaction between students themselves as well as the role of the lecturer and students during lectures. Finally, I employed the questionnaire in order to understand the attitudes of lecturers and students towards the research-teaching nexus in the research setting. The questionnaire involved the indicators of four curriculum dimensions and types of interaction in the classroom as a result of teaching methods used by the lecturer.

3.5.1 Case selection

The research was a case study of Eduardo Mondlane University (UEM) and involved four year undergraduate students from licenciatura-level courses in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. I selected the courses previously mentioned because my objective was to identify, analyse, compare and contrast the curriculum designs, as well as teaching methods, learning

approaches and teaching practices used by the teaching staff to link teaching and research in higher education in the field of education involving soft disciplines and in the field of engineering consisting of hard disciplines. Moreover, I selected four year undergraduate licenciatura students since they have been studying in the research setting for four years. On account of this time span, it was possible for students to provide their experiences and points of view about the research-teaching nexus throughout their licenciatura courses from year 1 to year 4. As a result, this helped to understand how research and teaching are brought together in undergraduate levels at UEM.

This study also involved the teaching staff from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. I chose this teaching staff for the same objective stated earlier.

3.6 Data collection procedures

As stated earlier, this study comprised four different research methods and the aim of using these different methods was to collect data and information in order to produce evidence from a variety of sources concerning with the research-teaching nexus in the research setting. Therefore, the findings of this study were produced by the four sources of data, namely the semi-structured qualitative interview with students and lecturers, the qualitative documentary analysis of the curriculum designs, the quantitative structured observations of lecturers and students during lectures as well as the quantitative questionnaires for lecturers and students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering.

First, I conducted individual interviews with students and lecturers in the EELC and CELC in order to explore the research topic. Second, I did a documentary analysis related to curriculum designs of the EELC and CELC. After that, I conducted classroom observations in the EELC and CELC and finally I administered questionnaires to students and lecturers in both courses. The sequence and rationale of employing the four research methods was explained in the next section.

3.6.1 Interview for students

In this study, I first employed a qualitative semi-structured interview in order to generate in-depth data about the research-teaching nexus from the experiences, points of view and beliefs of the participants in the research setting. In this case, I used the data and information from the qualitative interview to review the questions for the subsequent research methods.

I employed a cluster random sample for the interview. The cluster random sample involved 10 undergraduate students as research participants in the population of 3317 students in the Faculty of Education and the Faculty of Engineering at UEM. According to Agresti and Finlay (2009, p. 23) "a cluster sample uses a sample of the clusters rather than all of them. In cluster sampling, clusters are merely ways of easily identifying groups of [research participants]…. Most clusters are not represented in the eventual sample." In this context, the cluster sample of this study consisted of 4 undergraduate licenciatura courses run in the Faculty of Education and also 4 undergraduate licenciatura courses run in the Faculty of Engineering at UEM. That is to say, there were 8 undergraduate licenciatura courses run in the two faculties mentioned previously. In this case, the 8 courses were considered as clusters. However, among the 8 clusters (courses), I selected two clusters (courses) in which I drew the research sample and these clusters (courses) represented other clusters for the interview. Meanwhile, I interviewed 5 undergraduate students from year 4 in the EELC of the Faculty of Education and also 5 undergraduate students from year 4 in the CELC of the Faculty of Engineering at UEM. The rationale for selecting the two courses was given earlier in this chapter.

Because of my limited human and financial resources to conduct interview, few students were interviewed as a research sample. Nevertheless, these few participants provided meaningful responses to the questions designed for the interview about the research topic (The research-teaching nexus in Mozambican higher education curricula) since the participants had experienced the research topic from 1 to year 4 of their courses. Hence, this length of time helped the participants to provide insights and discernment about the research topic.

The interview was conducted face-to-face and recorded. Each participant had

approximately 40 minutes to answer the questions from the interview guide which consisted of four main items with their respective questions (see appendix A on page 187 and appendix C on page 201) and the transcripts of interviews with students from EELC are displayed in appendix A (see table 2 on page 191) and the transcripts of interviews with students from the CELC are displayed in appendix C (see table 3 on page 205)**.**

3.6.2 Interview for lecturers

I conducted a qualitative semi-structured interview in order to obtain insights how lecturers in the disciplines of education and engineering perceive the linkage between research and teaching in the undergraduate levels in the scope of curriculum designs and teaching practices.

The interview was conducted to a cluster random sample of 6 lecturers as research participants in the population of 195 lecturers. The cluster random sample comprised 3 lecturers in the EELC of the Faculty of Education and 3 lecturers in the CELC of the Faculty of Engineering at UEM. As stated earlier in this chapter, there were 8 courses run in the Faculty of education and the Faculty of Engineering. In this study, the 8 courses were regarded as clusters. Among the 8 clusters (courses), I selected 2 clusters (courses) in the two faculties mentioned previously in order to draw the sample. The research participants from the two clusters represented their clusters and other clusters. Three lecturers in the EELC were submitted to an individual semi-structured interview. Likewise, three lecturers in the CELC were submitted to an individual semi-structured interview.

Due to my limited human and financial resources to conduct interview, few lecturers were interviewed as a research sample. Yet, these few lecturers provided meaningful responses to the questions designed for the interview about the research topic because the participants are experts and have experienced the research topic throughout the lecturing process in their areas of the study in which the interview was conducted.

The interview was recorded and took approximately 40 minutes for each participant to answer the questions from the interview guide which consisted of four main items with their respective questions (see appendix E on page 215 and appendix G on page

229). The transcripts of interviews with lecturers in the EELC and CELC are given in appendix E (see table 4 on page 219) and appendix G (see table 5 on page 233) respectively.

The interview for students and lecturers was first designed in English and then translated into Portuguese see appendixes B (on page 197) and appendix D (on page 211) as well as appendixes F (on page 225) and appendix H (on page 241) since I wrote my dissertation in English as an optional language for my master course. In contrast, the research participants were supposed to be interviewed in Portuguese because it is the official language spoken in the research setting. Subsequently, the interviews were transcribed verbatim in Portuguese and translated into English after its analysis.

3.6.3 Documentary analysis

I did qualitative documentary analysis as my objective was to identify the elements of the curriculum designs suggested by the EELC in the Faculty of Education and the CELC in the Faculty of Engineering at UEM in order to link research and teaching in higher education.

The analysis of the elements of the curriculum designs in the EELC and CELC entailed the skills focused, teaching methods, learning activities and assessment activities (see appendixes I and J on pages 245 and 250 respectively). Furthermore, the data obtained through the documentary analysis from the EELC are provided in appendix I (see table 6 on page 246). In the same way, the data obtained through the documentary analysis from the CELC are provided in appendix J (see table 7 on page 251).

I used the elements of the curriculum designs mentioned earlier to compare and contrast the curricula of the EELC and CELC and analyse their similarities and differences in the way they bring teaching and research together in the fields of education and engineering involving soft disciplines and hard disciplines respectively.

3.6.4 Observations

I conducted structured classroom observations because my objective was to

understand the practical application of the curriculum designs in the scope of the teaching practices used by the teaching staff to bring teaching and research together. In addition, the classroom observations helped to check the convergence and accuracy of the data obtained throughout other research methods specifically the interviews and documentary analysis. In this context, the classroom observations were concerned with teaching practices including classroom interaction, roles of both the lecturer and students and learning behaviour as a result of the teaching methods such as the teacher-focused method and/or the student-focused method used during lectures in the EELC and CELC (see appendix K on page 255 and appendix L on page 258 respectively). The results from classroom observations are displayed in appendix K (see table 8 on page 257) and appendix L (see table 9 on page 260).

During observation, I marked the items for observation in the interval of 10 minutes of its occurrence within 90 minutes of a lecture. In this way, the item that occurred and lasted 10 minutes was marked as very good; the item that occurred and lasted 7 minutes was marked as good; the item that occurred and lasted 5 minutes was marked as fair; the item that occurred and lasted 3 minutes was marked as poor; the item that occurred and lasted 2 minutes or less was marked as very poor. Finally, the items that did not occur, but they were designed for observation was marked as not applicable.

I employed a cluster random sample of the two streams as research participants from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering. The cluster random sample involved the population of 3317 students as well as the population of 195 lecturers. As stated previously in this chapter, 8 undergraduate licenciatura courses of the Faculty of education and the Faculty of Engineering were considered as clusters. Among 8 clusters, I used two clusters as a research sample. The two clusters were the representative of other clusters for observations. I selected two clusters to conduct observations in order to examine the teaching practices used by the teaching staff to link teaching and research during lectures. The observations were held in a period of one month (from September to October 2015) in which 14 lectures were observed in both EELC and CELC. Meanwhile, the observations in both courses were divided into four areas with their respective items (see appendixes K on page 255 and appendix L on page 258).

3.6.5 Questionnaires for students

I used a likert scale quantitative questionnaire of 1 (strongly agree), 2 (agree), 3 (neither agree and nor disagree), 4 (disagree) and 5 (strongly disagree) in order to understand students' attitudes towards the research-teaching nexus in their courses.

I employed a cluster random sample of 46 students as research participants in the population of 3317 students in the Faculty of Education and the Faculty of Engineering at UEM. As noted previously in this chapter, there were 8 courses run in the Faculty of Education and the Faculty of Engineering at UEM. The 8 courses were considered as clusters. Among 8 clusters, I selected two clusters (courses) which I used them as a research sample. The EELC was composed of 23 year 4 students in the morning and night shift streams while in the CELC was composed of 23 year 4 students in the morning shift. This means that, I used a cluster sample of 23 students in each course for questionnaire. However, the sample of the EELC consisted of year 4 students from the morning and night shift because there were few year 4 students in the morning shift in the EELC comparing to the CELC.

I gave respondents the questionnaires in the research setting. In this context, I provided copies of questionnaires to 25 undergraduate licenciatura year 4 students in the EELC. Also, I provided copies of questionnaires to 25 undergraduate licenciatura year 4 students in the CELC. In both courses, I gave respondents 10 days to complete the questionnaires and I collected the questionnaires from the respondents in the research setting. The questionnaires for students in the EELC and CELC were divided into four areas with their respective items (see appendixes M on page 261 and appendix O on page 267 respectively).

3.6.6 Questionnaires for lecturers

I used a likert scale quantitative questionnaire of 1 (strongly agree), 2 (agree), 3 (neither agree and nor disagree), 4 (disagree) and 5 (strongly disagree) in order to understand lecturers' attitudes towards the research-teaching nexus in the EELC and CELC. As noted previously in this chapter, there were 8 courses run in the Faculty of Education and the Faculty of Engineering. The 8 courses were regarded as clusters. Among 8 clusters, I selected two clusters (courses) which I used as a research sample. I employed a cluster random sample of 14 lecturers as research participants in the

population of 195 lecturers in the Faculty of Education and the Faculty of Engineering at UEM.

I gave the respondents the questionnaires in the research setting. In this case, I provided copies of questionnaires to 10 lecturers in the EELC. Similarly, I provided copies of questionnaires to 10 lecturers in the CELC. In both courses, I gave the respondents 10 days to complete the questionnaires and I collected the questionnaires from the respondents in the research setting. The questionnaires for lecturers in the EELC and CELC were divided into 4 areas with their respective items (see appendixes Q on page 273 and appendix S on page 279 respectively).

The questionnaires for both students and lecturers were first designed in English and then translated into Portuguese (see appendixes N on page 264 and appendix P on page 270 as well as appendixes R on page 276 and appendix T on page 282) for the same reasons given previously in the interview section.

3.7 Data analysis

This section focuses on the procedures for analysis of four research methods after data collection. The section is divided into four sub-sections. The first sub-section deals with the procedures for analysis of interviews. The second sub-section is related to procedures for analysis of documents. The third sub-section is regarded to procedures for analysis of observations. Finally, the fourth sub-section provides the procedures for analysis of questionnaires.

3.7.1 Interview analysis

This sub-section is concerned with analysis of the interview after the interview data collection in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. The framework of the interview data analysis was adapted from Rodrigues (2014) and the data were analysed by hand in the process that follows:

First, I listened to the recorded qualitative interviews and I transcribed them verbatim. Second, I read the transcribed data line by line in order to find out ‘key words’, ‘main ideas’ and ‘anchorages’ (theories, concepts or principles which support such main ideas). Next, I drew two tables being one for the EELC, other for the CELC of the

faculties mentioned earlier, and I divided each table into three columns of data. Then I wrote on the top of the first column ‘key words’ and in the rows of this first column I wrote the questions of the interview in ordered sequence from the first question up to the last one and their respective answers provided by the interviewees. For example, the interview for students in the EELC involved 5 undergraduate year 4 students. In this case, in the rows of the first column I wrote the questions for the interviews in ordered sequence (from the first question of the interview up to the last one) and their respective answers provided by each of the 5 interviewees. Then, I used a green colour to code the ‘key words’ from the answers given by the interviewees in every single question of the interview. After that, I grouped together the ‘key words’ of the same content and I identified them by using different colours such as blue, red, yellow and others.

The second column was about the main ideas of the information provided by the interviewees. I wrote on the top of the second column ‘main ideas’ and in the rows of this second column I put the recurrent ideas and the common subjects of the information given by the interviewees and their beliefs as well as their succinct and objective descriptions made.

The third column was concerned with the anchorages, thus, on the top of this column I wrote ‘anchorages’ (theories, concepts or principles which support main ideas). In the rows of the third column, I wrote respective theories, concepts or principles that could support the main ideas from the second column. However, this demanded revision of literature again in order to find possible theories, concepts, or principles that could sustain the main ideas.

Fourth, I drew two tables being one for the EELC and other for the CELC and I divided each table into two columns of data. Next, I wrote on the top of the first column ‘key words/main ideas’ and on the top of the second column, I wrote ‘discourses of collective subject’. Then, in the rows of the first column of the table, I wrote the key words and main ideas of the same anchorage. In the rows of the second column, I linked the key words/main ideas using connectives and I established the relationship between key words/main ideas through cause and effect, attribution or

association. Nonetheless, the key words/main ideas were linked in ordered sequence according to their respective anchorages or main themes namely research-based, research-tutored, research-oriented and research-led. Finally, I put the discourses of the collective subject from interview analysis in tables as it can be seen in appendix A (see table 2 on page 191), appendix C (see table 3 on page 205), appendix E (see table 4 on page 219) and appendix G (see table 5 on page 233).

3.7.2 Documentary analysis

This section is related to the documentary analysis (curriculum design analysis) from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. The framework of documentary data analysis was adapted from Rodrigues (2014) and the documentary analysis was conducted by hand after the interview analysis in the following way:

First, I read the curriculum designs from the EELC and CELC in order to identify the 'key words', 'main ideas' and 'anchorages' (theories, concepts or principles which support main ideas). Second, I drew two tables being one for the EELC and the other for the CELC and I divided each table into three columns. Next, I wrote on the top of the first column the 'key words' for each of the tables of the course and in the rows of the first column I wrote the skills focused in each of the curricula; teaching methods, types of teaching-learning activities, information about the students (student roles, patterns of students' grouping recommended or implied), information about the lecturer (lecturer roles, types of interaction between the lecturer and students), evaluation (types of assessment suggested). Then, I used a green colour code to mark the 'key words' from the curriculum discourse (language used in the curriculum design) for each of the courses mentioned earlier. After that, I grouped together the 'key words' of the same content and I used different colour codes such as black, blue, brown, and others to identify the 'key words'.

The second column was concerned with the main ideas of the language used in the curriculum designs. I wrote on the top of the second column 'main ideas' and in the rows of this second column I recorded the recurrences of curriculum language content namely common words, phrases and subjects from curriculum discourses.

The third column was related to anchorages (theories, concepts or principles which support the key words and main ideas). On the top of this column, I wrote 'anchorages' and in its rows I wrote the theories, concepts, or principles that supported the key words and main ideas from the first and the second column.

Fourth, I drew two tables being one for the EELC of the Faculty of Education and the other for the CELC of the Faculty of Engineering and I divided each table into two columns of data. Next, I wrote on the top of the first column 'key words/main ideas' and on the top of the second column, I wrote 'discourses of collective subject'. Then, in the rows of the first column of the table, I wrote the keywords and main ideas of the same anchorage. In the rows of the second column, I linked the key words/main ideas using connectives and I established the relationship between key words/main ideas through cause and effect, rationale and association. Nonetheless, the key words/main ideas were linked in ordered sequence according to their respective anchorages, specifically research-based, research-tutored, research-oriented and research-led. Finally, I put the discourses of the collective subject from documentary analysis in tables as shown in appendix I (see table 6 on page 246) and appendix J (see table 7 on page 250).

3.7.3 Observation analysis

This section is concerned with observation data analysis from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM after the documentary analyse. The observation analysis was conducted by hand in the following sequence:

First, I made a table for each of the two courses mentioned earlier and I divided the table into 7 columns. On the top of the first column, I wrote the 'items for observation during lectures'. In the second, third, fourth, fifth, sixth and seventh columns I wrote quasi-quantifiers namely 'Very good', 'Good', 'Fair', 'Poor' 'Very poor' and 'Not applicable' respectively. Then in the rows of the first column, I wrote the items for observation one at a time, meanwhile, in the rows from the second column up to the seventh one I recorded the number of marks each item had during observations in order to show its frequency during lectures. After that, I established the relationship

between data categories through cause and effect and rationale. Finally, I summarised the data in the form of tables as demonstrated in appendix K (see table 8 on page 257) and appendix L (see table 9 on page 260).

3.7.4 Questionnaire analysis

This section is about the data analysis of the Likert-scale questionnaires of strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. The Likert-scale questionnaire was the last to be analysed and it was analysed by a computer. In this case, I employed a statistical package for social science called SPSS 19 to analyse the data from the questionnaire. Furthermore, I established the relationship among data categories through rationale and association. Then, I summarised the data from questionnaires in the form of tables and these tables are shown throughout the data presentation section.

Finally, the results from the four research methods were combined and interpreted so that they could find out answers to the research questions.

3.8 Validity of the study

Creswell (2009) states that the sample of participants as representative of a population for research can be selected at random to balance the characteristics that make research participants capable of the outcome. In the light of this statement, I randomly selected the research participant samples from different faculties (faculties of education and engineering) with distinct fields of study involving soft disciplines and hard disciplines as well as different research participant jobs (lecturers and students) in order to increase the validity of the study. Maxwell (2005) argues that a researcher can reduce the risk of biases and other issues that may threaten his/her study by employing different kinds of research methods for data collection involving a diverse range of participants and settings. As a consequence, this can help the researcher to assess the explanation of the main findings of the study. Creswell (2009, p. 191) supports that "if themes are established based on converging several sources of data or perspectives from participant, then this process can be claimed as adding to the validity of the study." In this study, I used data source of information from different research methods namely interview, documentary analysis observation and questionnaire to build coherent explanation for the research topic. Furthermore, in

order to bring true value of data, I maintained contact with the research participants during the data analysis and interpretation so that I could have opportunity to check the issues that needed clarification concerning with the reality and meanings of the research participants. Likewise, in attempt to look for the validity of the study, I asked peer students and lecturers in the field of higher education studies as peer examiners and external examiner respectively. This helped me re-examine biases, assumptions and flaws in data collection procedures as well as re-examining the interpretation of data and conclusions of the study.

3.9 Ethical considerations of the research

Bryman (2008) says that a researcher needs to be honest with the participants involved in the research activities and the researcher should inform the participants about the research process if not he or she may discourage the participants to provide him or her honest data. In this research, I gave the research participants detailed information about the research topic, the objective, research questions and methods through formal letters. Besides, I maintained confidentiality of the data provided by the participants as well as their anonymity. Sequentially, I explained to the research participants that the data provided would be discarded six months after finishing the research in order to maintain their confidentiality. Eichelberger (1989, p. 36) claims that "confidentiality is an important aspect of treating research participants in an ethical manner. [That is] treating others in a way that [the researcher likes] to be treated... is a good foundation for ethical behaviour, but it is somewhat ambiguous." Nevertheless, in this research, I treated the research participants without any ambiguity. This means that I gave the participants detailed information mentioned earlier. Furthermore, I first asked the board of the research setting (UEM) for permission to conduct my research.

3.10 Limitations of the study

The study was thoroughly conducted even so it had some limitations. First, the limitation of this study was that it was only conducted in two courses specifically the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM in the fields of education and engineering involving soft applied disciplines and hard applied disciplines respectively. In this case, the findings of the study may only

be generalisable to other courses from other faculties at UEM or other higher education institutions in the fields consisting of soft applied disciplines and hard applied disciplines. Thus, to overcome this limitation future research should involve more higher education institutions in Mozambique and more courses from different fields comprising hard and pure disciplines, hard and applied disciplines, soft and pure disciplines as well as soft and applied disciplines. Second, the limitation of the study was that the quantitative questionnaires involved a small sample of the respondents because of financial constraints to devise the questionnaires with a larger sample.

Third, the limitation of the study was that it was not able to cover items related to the age and gender of the students in attempt to understand how the age and gender factors can influence the integration of research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. Furthermore, the study was not able to cover items concerning with the lecturers' course training for teaching and research in higher education and pedagogical research experience on curriculum designs and teaching practices as well as lecturers' academic freedom, motivation and financial or moral support in order to explore how these factors can influence the link between research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. Finally, the limitation of the study is that there is little discussion from the existing literature about designing and using curricula specifically research-based, research-tutored, research-oriented and research-led in order to integrate research and teaching in higher education. The next chapter is concerned with the data presentation of the study.

CHAPTER 4 DATA PRESENTATION

4.1 Introduction

As stated in chapter 1, the aim of this study was to understand the linkages between research and teaching through curriculum designs and teaching practices used in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

Chapter 4 focuses on the presentation of data obtained through four research methods namely a semi-structured qualitative interview with students and lecturers, a qualitative documentary analysis of the curriculum designs, a quantitative structured observation of lecturers and students during lectures as well as a quantitative questionnaire for lecturers and students from the EELC and CELC of the faculties mentioned previously.

In exploring the research questions outlined in chapter 1, four main variables of the research-teaching nexus, such as research-based, research-tutored, research-oriented and research-led and their respective indicators outlined in figure 5 (see page 37) were identified and analysed. The four variables mentioned previously and their respective research methods are presented in next sections.

4.2. Data presentation of the variable research-based

This section focuses on the data presentation related to the variable research-based. The section presents, compares and contrasts the data obtained through three research methods: semi-structured qualitative interview, qualitative documentary analysis and quantitative questionnaires conducted to year 4 undergraduate students and their lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. The section is subdivided into three sub-sections. The first sub-section deals with the data presentation of the variable research-based collected through the semi-structured qualitative interview. The second sub-section is regarded to the data presentation of the variable research-based obtained through the qualitative documentary analysis and the third sub-section is related to the data presentation of the variable research-based gathered from the quantitative

questionnaire.

4.2.1 Data presentation of the variable research-based from the semi-structured qualitative interview with students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section is concerned with the data presentation associated with the variable research-based. The sub-section presents, compares and contrasts the data obtained through the qualitative interview with year 4 undergraduate students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM in attempt to link research and teaching in higher education. The data are presented in table 2 and table 3 (see pages 60 and 61 respectively).

Table 2 (on page 60) and table 3 (on page 61) show the data of the variable research-based collected through the semi-structured qualitative interview with year 4 undergraduate students in the EELC and CELC of the faculties mentioned earlier. Table 2 and table 3 give details about engagement of students in authentic research such as research projects and fieldwork throughout their courses in order to integrate teaching and research in higher education.

In table 2 (see page 60), [Interviewee 3] said that he had conducted individual and group research projects during his course. For example, he had conducted research projects in the discipline of Educational Research Methods. In this discipline, he had conducted a research project about environmental education at Guazamuthini Secondary School in Marracuene. Likewise, in table 2, [Interviewee 2] added that he had conducted a research project about pollution of rivers due to the use of mercury to extract gold in Manica province and in this project he designed instructions for a river pollution solution.

In table 2 (see page 60), [Interviewee 1] revealed that in the scope of the fieldwork activities held in their course, he had conducted fieldwork interviews and observations in the environmental area on Inhaca Island and the objective of this fieldwork was to interview the community about socio-environmental issues. Similarly, [Interviewee 3] in table 2 pointed out that he had conducted fieldwork

interviews about solid waste in resource centres at UEM… he had undertaken fieldwork observations and interviews about environmental problems in the community of Limpopo National Park in Gaza province [in the scope of field activities]….

In table 2 (see page 60), [Interviewee 4] commented that:

> *Even though students have conducted research throughout their course, it is the poor quality due to the lack of critical view and supervision. In this case, I think that lecturers should give more priority to critical research because students read and reproduce knowledge. This means that we have limitations on how to do research. In spite of having the discipline of Research Methods, I think it is not enough….we should have a discipline of Monographs in year 3 and year 4 so this discipline could reinforce the discipline of research methods as it aims to introduce how to do research. Moreover, the discipline of Monographs could help students conduct actual research instead of talking about research….*

Whereas in table 3 (see page 61), [Interviewee 5] noted that students had conducted research projects in groups and individually and this kind of activities required the class to be divided into groups in order to develop research. For example, in the discipline of Environmental Impacts and Security students had conducted a research project in groups about the study of environmental impacts for transferring the market called Mercado de Peixe in Maputo City to another location in the city. In table 3 (on page 61), [Interviewee 4] mentioned that… students conducted research projects such as water supply in Monapo Village last semester [2015]. Also, the students did some projects, for example, cost assessment projects for construction of a building and a bridge as well as measurement of a hangar. Likewise, in table 3 (on page 61), [Interviewee 3] added that in the discipline of Introduction to Engineering, students conducted fieldwork…[for example], for those who had topics related to society such as urbanisation….went to a community called Bairro de Mafala to conduct interviews with the residents of this community in order to understand how they deal with their water piping system. In table 3 (see page 61), [Interviewee 5] revealed that "one of

the projects that made us conduct some interviews was the project about transferring Mercado de Peixe. As this project was developed out of the faculty we had to go and see things in the field. Nonetheless, in many projects that we have been assigned do not require interviews for their development."

In table 3 (see page 61), [Interviewee 1] acknowledged that:

> *We have not specifically developed research projects, yet we have some assignments to consolidate the knowledge taught during lectures not necessarily research projects. For example, the lecturers teach us how to calculate the structure of a construction work in the classroom. Then the lecturers give us a project or a floor plan to design and after that we calculate the project or construction costs.*

In table 3 (see page 61), [Interviewee 5] admitted that…"we are not devoted to research as such in this faculty instead we have some assignments in which we read some books or we go to internet to do some brief investigation in order to write certain assignments and submit them to the lecturer for assessment." In table 3 (on page 61) [Interviewee 2] supported that "I have written and presented research projects at the level of the discipline for my class attendance grade. In this case, we have presented the project and after the presentation the lecturer asks some questions and then provides the grade…."

Table 2: The variable research-based and the discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the EELC of the Faculty of Education-UEM

Variable 1: Research-based
[Interviewee 3]: I have conducted individual and group research projects during my course. For example, I have conducted research projects in the discipline of Educational Research Methods and I have conducted a research project about environmental education at Guazamuthini Secondary School in Marracuene. [Interviewee 2]: I have conducted a research project about pollution of rivers due to the use of mercury to extract gold in Manica province. In this project, I designed instructions for river pollution solution.

[Interviewee 1]: In the scope of the fieldwork activities held in our course, I have conducted fieldwork interviews and observations in the environmental area on Ilha de Inhaca and the objective of this fieldwork was to interview the community about socio-environmental issues. In this case, we conducted fieldwork interviews about the relationship between society and environment.

[Interviewee 3]: I have conducted fieldwork interviews about solid waste in resource centres at UEM. In addition, I have done fieldwork observations and interviews about deforestation in Matutuine. Similarly, I have done fieldwork observations and interviews about environmental problems in the community of Limpopo National Park in Gaza province and I have done an interview about an educational project at Guazamuthini Secondary School in Marracuene.

[Interviewee 4]: Even though students have conducted research throughout their course, it is the poor quality due to the lack critical view and supervision. In this case, I think that lecturers should give more priority to critical research because students read and reproduce knowledge. This means that we have limitations on how to do research. In spite of having the discipline of Research Methods, I think it is not enough. In this context, I suggest that we should have a discipline of Monographs in year 3 and year 4 so this discipline could reinforce the discipline of research methods as it aims to introduce how to do research. Moreover, the discipline of Monographs could help students conduct actual research instead of talking about research.

Table 3: The variable research-based and the discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the CELC of the Faculty of Engineering-UEM

Variable 1: Research-based
[Interviewee 5]: We have conducted research projects in groups. For instance, in the discipline of Environmental Impacts and Security we have done research projects in groups regarding to the study of environmental impact from transferring of 'Mercado de Peixe' in Maputo City to another location in the same city.
[Interviewee 4]: We did research projects such as water supply in Monapo Village

last semester [2015]. Also, we did projects, for example, cost assessment projects for construction of a building and a bridge as well as measurement of a hangar.

[Interviewee 3]: At the beginning of the discipline of Introduction to Engineering, we have been assigned fieldwork for those who had topics related to society such as urbanisation. In this context, we had a topic about water piping system and then we went to a community called Bairro de Mafala to conduct interviews with the residents of this community in order to understand how they deal with their water piping system.

[Interviewee 3]: One of the projects that made us conduct some interviews was the project about transferring Mercado de Peixe. As this project was developed out of the faculty we had to go and see things in the field. Nonetheless, in many projects that we have been assigned do not require interviews for their development.

[Interviewee 1]: We have not specifically developed research projects, yet we have some assignments to consolidate the knowledge taught during lectures not necessarily research projects. For example, the lecturers teach us how to calculate the structure of a construction work in the classroom. Then the lecturers give us a project or a floor plan to design and after that we calculate the project or construction costs.

[Interviewee 5]: You are asking many questions which involve research, but we are not devoted to research as such in this faculty instead we have some assignments in which we read some books or we go to internet to do some brief investigation in order to write certain assignments and submit them to the lecturer for assessment.

[Interviewee 2]: I have written and presented research projects at the level of the discipline for my class attendance grade. In this case, we have presented the projects and after the presentation the lecturer asks some questions and then provides the grade. For instance, we conducted a project about water supply to Monapo Village last semester [2015] and this project was assessed quantitatively.

4.2.2 Data presentation of the variable research-based from the semi-structured qualitative interview with lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section is related to data presentation of the variable research-based obtained through the qualitative interview with lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering about how lecturers involve students in authentic research in order to link research and teaching and the data are presented in table 4 (see page 66) and table 5 (see page 67).

Table 4 (on page 66) and table 5 (on page 67) show the results of the variable research-based gathered from the semi-structured qualitative interviews with lecturers in the EELC and CELC. Table 4 and table 5 provide details about research-based activities that lecturers use in order to integrate teaching and research in the courses mentioned previously.

In table 4 (see page 66), [Interviewee 2] asserted that:

> *I have conducted research projects with my students. Now, I am developing a research project with one of my students about satisfaction of environmental education licenciatura students with their course including teaching methods. Another project that is going on is about the level of satisfaction of people who use improved cooking stoves as it is believed that the improved cooking stoves are important to the environment. In this project, I have worked with year 3 licenciatura students, yet, the selection criteria of the students who participate in the project depends on the talent and interests of the student. Sometimes, I make a competition among students in the class with three criteria as follows: First, students should be in year 3 or year 4 and they should not have disciplines that they have failed in the previous years. Second, the student should have good academic records. Third and the last, student should have basic knowledge of English. On the whole, we look for the best students to assist the projects of lecturers.*

In table 4 (see page 66), [Interviewee 1] said that students had undertaken fieldwork interviews and observations…. they have had had activities such as environmental education practices aimed to interact students with the community in order to find out environmental problems and analyse whether they were actually environmental problems or not after interviewing the community. Meanwhile, in table 4, [Interviewee 2] stated that he had given students lectures about environmental practices in some disciplines. For example, in his discipline…[students]…had conducted interviews and observations in order to link environmental problems to climate and how people react to this kind of problems…After the observations and interviews, students analysed the data.

[Interviewee 3] in table 4 (see page 66) commented that:

> *We have some research projects that we have involved our students even though we cannot say that students conduct research, but we can say that they participate in the lecturers' research and use this experience for their monographs. In addition, I would be happy if all students of the EELC finished their course with monographs while some students do bibliography and others do an internship report, I cannot express my satisfaction with students' research.*

Similarly, in table 5 (see page 67), [Interviewee 3] noted that he had conducted research projects with his students in collaboration with Engineering Laboratory of Mozambique…. For example, he developed… final course projects with his students. [Interviewee 1] in table 5 (on page 67) explained that the projects undertaken may be divided into two parts namely disciplinary projects and discipline of the end of the course projects done in the fourth year of the course. In the former, students received assignments and read some bibliography and after that they did some calculation and wrote a report and defended it in the classroom in groups or individually. However, in the latter, students were given course project assignments at the beginning of the semester and these projects were monitored by the lecturer.

In table 5 (see page 67), [Interviewee 3]) revealed that "students have done licenciatura course projects or professional internships to finish their licenciatura

course… licenciatura projects consist of investigation of the elements needed to calculate a construction work. For example, the investigation of elements needed to calculate a [construction of a bridge] or…essays required."

In table 5 (see page 67), [Interviewee 2] explained that his students were integrated in teams in order to do laboratory activities specifically data collection, treatment of information and monitoring of laboratory essays. Simultaneously, students developed test patterns for translation of structure behaviour under his supervision. Nevertheless, this was done in the last semester of the course as a licenciatura capstone project. In this semester, students were recruited in order to do investigation even though it was not a systematic process. Sometimes, students participated in essay activities and laboratory experiences in the disciplines such as Construction of Materials, Concrete, Bridges and Public Works.

In table 5 (see page 67), [Interviewee 1] commented that:

> *It is not common for the lecturer to invite students for assistance of lecturers' research projects for two reasons as follow: first, in my opinion, there is no condition at the level of engineering disciplines for doing research due to the lack of means. Second, if we have research work, it is linked to a particular and tight objective that does not match with time and curriculum obligations of the students. Besides, students have low capacity for doing research, yet the student may have a project in which I also have a benefit so we can do the project together. In this case, my objective is to develop students' capacity for enquiry and research.*

In table 5 (on page 67) [Interviewee 3] noted that "…in my opinion, this component of research should be incorporated throughout the curriculum because at the end of the course students could have a solid notion to start a research career…. I would like to suggest the creation of continuous grants… for the initiation of research in order to stimulate students to follow a research career."

[Interviewee 2] in table 5 (see page 67) admitted that:

I have never assessed my students on development and presentation of research projects since my discipline consists of laboratory work which limits on showing some equipment and techniques how things should be done, for instance how to prepare a sample. In addition, the curriculum does not have space to integrate a component of research projects. Consequently, we end up doing laboratory assignments, but a large number of these assignments are done in collaboration with Engineering Laboratory of Mozambique [outside of the faculty]. In this context, the students from the Faculty of Engineering go to the laboratory mentioned earlier in order to assist laboratory essays there.

Table 4: The variable research-based and the discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in the EELC of the Faculty of Education-UEM

Variable 1: Research-based
[Interviewee 2]: I have conducted research projects with my students. Now, I am developing a research project with one of my students about satisfaction of environmental education licenciatura students with their course including teaching methods. Another project that is going on is about the level of satisfaction of people who use improved cooking stoves as it is believed that the improved cooking stoves are important to the environment. In this project, I have worked with year 3 licenciatura students, yet, the selection criteria of the students who participate in the project depends on the talent and interests of the student. Sometimes, I make a competition among students in the class with three criteria as follows: First, students should be in year 3 or year 4 and they should not have disciplines that they have failed in the previous years. Second, the student should have good academic records. At last, student should have basic knowledge of English. Overall, we look for the best students to assist the projects of lecturers. [Interviewee 1]: Students have undertaken fieldwork interviews and observations. For example, the students have conducted fieldwork interviews and observations about the project regarding to improved cooking stoves in which students not only

interviewed the users of the improved stoves but also they observed the stoves. After the field interview and observation, students had to analyse the data. Moreover, we have had activities such as environmental education practices aimed to interact students with the community in order to find out environmental problems and analyse whether they are actually environmental problems or not after interviewing the community.

[Interviewee 2]: we have some lectures about environmental practices in some disciplines. For example, in my discipline which is Climate and Climate Changes, we have done interviews and observations in order to link environmental problems to climate and how people react to this kind of problems. Then we relate the problem to socio-environmental aspects and its discipline. After the observations and interviews, students analyse the data.

[Interviewee 3]: We have some research projects that we have involved our students even though we cannot say that students conduct research, but we can say that they participate in the lecturers' research and use this experience for their monographs. In addition, I would be happy if all students of the EELC finished their course with monographs while some students do bibliography and others do an internship report, I cannot express my satisfaction with students' research.

Table 5: The variable research-based and the discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in the CELC of the Faculty of Engineering-UEM

Variable 1: Research-based
[Interviewee 3]: I have conducted research projects with my students in collaboration with Engineering Laboratory of Mozambique [outside of the Faculty of Engineering]. However, the assignments done are integrated according to the guidelines and interest designed by the laboratory. For example, I developed three final course projects with my students. [Interviewee 1]: It is important to divide the projects into two parts such as projects at the level of the discipline and discipline of the end of the course projects done in the

fourth year of the course. In the project of the discipline, students receive assignments and read some bibliography and after that they do some calculation and write a report and defend it in the classroom in groups or individually. Whereas, in the discipline of course projects, students are given course projects assignments at the beginning of the semester and the lecturer monitors these projects.

[Interviewee 3]: Students have done licenciatura course projects or professional internships to finish their licenciatura course. In this case, licenciatura projects consist of investigation of the elements needed to calculate a construction work. For example, the investigation of elements needed to calculate a bridge or its foundation and essays required.

[Interviewee 2]: My students are integrated in teams in order to do laboratory activities specifically data collection, treatment of information and monitoring of laboratory essays. Simultaneously, students develop test patterns for translation of structure behaviour under my supervision. Nevertheless, this is done in the last semester of the course as a licenciatura capstone project. In this semester, students are recruited in order to do investigation even though it is not a systematic process. Sometimes, students participate in essay activities and laboratory experiences in the disciplines such as Construction of Materials, Concrete, Bridges and Public Works.

[Interviewee 1]: It is not common for the lecturer to invite students for assistance of lecturers' research projects for two reasons as follow: first, in my opinion, there is no condition at the level of engineering disciplines for doing research due to the lack of means. Second, if we have research work, it is linked to a particular and tight objective that does not match with time and curriculum obligations of the students. Besides, students have low capacity for doing research, yet the student may have a project in which I also have a benefit so we can do the project together. In this case, my objective is to develop students' capacity for enquiry and research.

[Interviewee 3]: I have assessed my students on fieldwork interviews and observations and this have occurred in the licenciatura capstone projects. Nonetheless, in my opinion, this component of research should be incorporated

throughout the curriculum because at the end of the course students could have a solid notion to start a research career. Therefore, I would like to suggest the creation of continuous grants for students if it is possible for the initiation of research in order to stimulate students to follow a research career.

[Interviewee 2]: I have never assessed my students on development and presentation of research projects since my discipline consists of laboratory work which limits on showing some equipment and techniques how things should be done, for instance how to prepare a sample. In addition, the curriculum does not have space to integrate a component of research projects. Consequently, we end up doing laboratory assignments, but a large number of these assignments are done in collaboration with Engineering Laboratory of Mozambique [outside of the faculty]. In this context, the students from the Faculty of Engineering go to the laboratory mentioned earlier in order to assist laboratory essays there.

4.2.3 Data presentation of the variable research-based from the documentary analysis in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section presents the data of the variable research-based obtained through documentary analysis of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM and the data are displayed in table 6 and table 7 (see page 70).

Tables 6 and 7 (on page 70) show the curriculum discourses of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM concerning with teaching-learning methods, teaching-learning activities and assessment. As can be seen in table 6 and table 7, there is a similarity of research activities and assessment that students should undertake in both courses. In this context, tables 6 and 7 illustrate that students should conduct research projects and they should be assessed on these activities in both courses.

Table 6: The variable research-based and the curriculum discourse of the EELC of the Faculty of Education-UEM

	Variable 1: Research-based
Teaching-learning methods	The teaching learning-methods were centred on the student. These methods included active participation of the student and critical thinking. The student was an agent of intervention and change through his/her curiosity, creativity and autonomy during teaching and learning process.
Teaching-learning activities	Undergraduate students undertook teaching-learning activities that consisted of individual and group research projects as well as self-study based on research. Likewise, the undergraduate students produced monographs at the end of the course which involved, for example, a case study or literature review.
Assessment	The assessment was based on research projects throughout the course and production of monographs at the end of the course.

Table 7: The variable research-based and the curriculum discourse of the CELC of the Faculty of Engineering-UEM

	Variable 1: Research-based
Teaching-learning methods	No description of teaching-learning methods.
Teaching-learning activities	Undergraduate students undertook teaching-learning activities that consisted of course projects and these projects included integrative knowledge from different disciplines for real problem solving.
Assessment	Development and presentation of course projects.

4.2.4 Data presentation of the variable research-based from questionnaires conducted to students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section is regarded to the data presentation of the variable research-based obtained through quantitative questionnaires conducted to year four undergraduate students from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM concerning with students' feelings, perceptions, or practices in relation to integration of teaching and research throughout their licenciatura courses. The data are presented in a table 8 (see page 73).

Table 8 (on page 73) indicates that the students from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM learnt how to do research and conduct research activities throughout their courses. Table 8 suggests that 87% and 86.9% of students from the EELC as well as 82.6% and 74.2% of students from the CELC undertake individual and group research projects respectively. In addition, table 8 indicates that 69.9% and 73.9% of students from EELC as well as 56.5% and 60.8% of the students from the CELC conduct interviews and observations as fieldwork activities respectively.

4.2.5 Data presentation of the variable research-based from questionnaires conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section is related to the data presentation of the variable research-based obtained through the questionnaires conducted to lecturers from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM concerning with lecturers' feelings, perceptions, beliefs and teaching practices in order to bring teaching and research together in the courses mentioned earlier. The data are presented in table 9 (see page 74).

Table 9 (on page 74) provides the percentage of lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM about activities that may help students learn how to do research and conduct authentic research activities. Table 9 shows that 100% and 85.7% of lecturers in the EELC as well as

85.5% and 85.5% of lecturers in the CELC believe that the use of research activities in the courses they lecture encourage students to do individual and group research projects respectively.

Despite the similarities of the data from the variable research-based teaching in questionnaires for students and lecturers, critical differences exist. According to table 9 (see page 74), 47.8% of the students in the EELC do not conduct research with their lecturers. By contrast, 47.8% of students in the CELC undertake research with their lecturers. Besides, table 9 (see page 74) suggests that 33.5% of students in the EELC are not assessed on research projects during or at the end of a semester. However, table 6 (see page 70) on the curriculum discourse reveals that students are supposed to be assessed on research projects during their courses. On the contrary, table 8 (on page 73) indicates that 91.3% of the students in the CELC are assessed on research projects during or at the end of a semester. Nevertheless, as can be seen from the data in table 9 (on page 74), 57.2% of lecturers in the EELC assess their students on fieldwork such as interviews or observations during or at the end of a semester whereas 42.9% of lecturers in the CELC were doubtful.

Table 8: The variable research-based from the questionnaires conducted to students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

Learning how to do research and doing research (N=23)

	EELC of the Faculty of Education					CELC of the Faculty of Engineering				
	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)
X1	6 (26.1)	14 (60.9)	1 (4.3)	1 (4.3)	1 (4.3)	4 (17.4)	15 (65.2)	2 (8.7)	2 (8.7)	
X2	3 (13.0)	17 (73.9)		2 (8.7)	1 (4.3)	5 (21.7)	12 (52.2)	5 (21.7)	1 (4.3)	
X3	3 (13.0)	13 (56.5)	5 (21.7)	2 (8.7)			13 (56.5)	6 (26.1)		4(17.4)
X4	4 (17.4)	13 (56.5)	3 (13.0)	2 (8.7)	1 (4.3)	3 (13.0)	11 (47.8)	4 (17.4)	3 (13.0)	2 (8.7)
X5	2 (8.7)	6 (26.1)	4 (17.4)	9 (39.1)	2 (8.7)	4 (17.4)	7 (30.4)	4 (17.4)	6 (26.1)	2 (8.7)
X6		4 (17.4)	8 (34.8)	8 (34.8)	3 (13.0)	4 (17.4)	7 (30.4)	4 (17.4)	6 (26.1)	2 (8.7)
X7	3 (13.0)	7 (30.4)	4 (17.4)	7 (30.4)	2 (8.7)	6 (26.1)	15 (65.2)	1 (4.3)	1 (4.3)	
X8		10 (43.5)	7 (30.4)	6 (26.1)		2 (8.7)	13 (56.5)	3 (13.0)	3 (13.0)	2 (8.7)

SA = Strongly agree; A = Agree; Neither agree Nor disagree; D = Disagree; SD = Strongly disagree

N = Number of respondents in each course; f = frequency; % = percentage

X1 - The learning activities used during your licenciatura course help you to conduct individual research projects.

X2 - The learning activities used during your licenciatura course help to conduct group research projects.

X3 - The learning activities used during your licenciatura course help you to conduct interviews in the field for research projects.

X4 - The learning activities used during your licenciatura course help you to conduct observations in the field for research projects.

X5 - The learning activities used during your licenciatura course help you to do research together with your lecturers.

X6 - The learning activities used during your licenciatura course help you to collect or analyze data for your lecturer's research.

X7 - You are assessed on research projects during or at the end of a semester.

X8 - You are assessed on fieldwork research during or at the end of a semester.

Table 9: The variable research-based from the questionnaires conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

Students learn how to do research and conduct research (N=7)

	EELC of the Faculty of Education					CELC of the Faculty of Engineering				
	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)
X1	3 (42.9)	4 (57.1)				4 (57.1)	2 (28.6)	1 (14.3)		
X2	2 (28.6)	4 (57.1)	1 (14.3)			4 (57.1)	2 (28.6)		1 (14.3)	
X3	4 (57.1)	2 (28.6)	1 (14.3)			1 (14.3)	3 (42.9)		2 (28.6)	1(14.3)
X4	3 (42.9)	3 (42.9)		1 (14.3)		1 (14.3)	5 (71.4)	1 (14.3)		
X5	2 (28.6)	3 (42.9)	1 (14.3)	1 (14.3)			5 (71.4)	1 (14.3)		1(14.3)
X6	3 (42.9)	1 (14.3)	1 (14.3)	1 (14.3)	1 (14.3)		4 (57.1)	2 (28.6)		1(14.3)
X7	1 (14.3)	3 (42.9)		2 (28.6)	1 (14.3)	2 (28.6)	3 (42.9)	2 (28.6)		
X8	1 (14.3)	3 (42.9)		2 (28.6)	1 (14.3)		2 (28.6)	3 (42.9)	1 (14.3)	1(14.3)

SA = Strongly agree; A = Agree; NAND = Neither agree Nor disagree; D = Disagree; SD = Strongly disagree

N = Number of respondents in each course; f = frequency; % = percentage

X1 - The use of research activities in the undergraduate licenciatura course you lecture foster students to conduct individual research projects.

X2 - The use of research activities in the undergraduate licenciatura course you lecture foster students to conduct group research projects.

X3 - The use of research activities in the undergraduate licenciatura course you lecture foster students to conduct interview in the field for research projects.

X4 - The use of research activities in the undergraduate licenciatura course you lecture foster students to conduct observations in the field for research projects.

X5 - The use of research activities in the undergraduate licenciatura course you lecture foster students to assist the lecturers' research in the course level, department or faculty level.

X6 - The use of research activities in the undergraduate licenciatura course you lecture foster students to collect or analyse data for lecturers' research.

X7 - You assess your students on research projects during or at the end of a semester.

X8 - You assess your students on fieldwork research during or at the end of a semester.

4.2.6 Summary of the data from the variable research-based in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

Overall, the data concerning with the variable research-based indicated that students conducted research projects and fieldworkthroughout their courses in the EELC and CELC of the Faculty of Education and the Faculty of Engineering-UEM respectively. Although students in the EELC and CELC conducted research projects in some disciplines of their area of the study, it was the poor quality due to the lack of critical view and supervision. Consequently, the projects and fieldwork that students undertook in the EELC and CELC led to reproduction of knowledge.

4.3. Data presentation of the variable research-tutored

This section is related to the data presentation of the variable research-tutored. The section presents, compares and contrasts the data from three research methods: semi-structured qualitative interview, qualitative documentary analysis and quantitative questionnaire conducted to year four undergraduate students and their lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. The section is subdivided into three sub-sections. The first sub-section is concerned with the data presentation of the variable research-tutored gathered from the semi-structured qualitative interview. The second sub-section concentrates on the data presentation of the variable research-tutored obtained through the qualitative documentary analysis and the third sub-section deals with the data presentation of the variable research-tutored collected from the quantitative questionnaire.

4.3.1 Data presentation of the variable research-tutored from the semi-structured qualitative interview with students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section is related to the data presentation of the variable research-tutored obtained through the semi-structured qualitative interviews with year four undergraduate students in the EELC of the Faculty of Education and the CELC of the

Faculty of Engineering at UEM concerned with involvement of students in discussion or analysis of academic essays or papers. The data are presented in table 10 and table 11 (see page 80 and 82 respectively).

In table 10 (on page 80), [Interviewee 2] asserted that lecturers had given students an analytic plan with bibliography related to a discipline in order to write essays, but students were also advised to look for the complementary bibliography. Furthermore, lecturers had recommended bibliography according to the discipline taught and other related disciplines in the area of the environmental education. In table 10, [Interviewee 3] acknowledged that he had written essays, for example, he wrote essays about the system of environmental management in Mac Mahon (2M) as well as essays about environmental sustainability and the common topics of essays were related to climate changes, global warming and pollution in general. [Interviewee 4] in table 10 pointed out that he had presented essays for discussion in the class and he had been assigned the topics of presentation by the lecturer or he had chosen his own presentation topics. For example, when students went to the fieldwork in the Limpopo National Park, they were assigned some topics to develop in the field and after few days they presented their assignments to the class and lecturers that were monitoring them.

[Interviewee 1] in table 10 (see page 80) explained that:

> *We usually do the presentations in seminars and we sit in different ways such in a round table, in groups or individually. However, the recurrent way of sitting during presentation is individual one while the group or a person presenting stays before the class to do the presentation. Meanwhile, after the presentation, there is a cycle time critical discussion about the presentation as well as contributions. Despite lecturers appeal for suggestions about any topic that has been presented, often, students leave contributions to make questions to see whether the presenter is competent with the topic or not. In this context, students probably want to reinforce the final assessment the lecturer will give to their fellow student who presented since assessment is the basis in the academy. At last, the lecturer closes the*

> *discussion and gives the benchmarks and the summary of the presentation in the sense that we should not be lost.*

[Interviewee 5] in table 10 (see page 80) noted that lecturers differed in the ways they organised students' presentations and class discussion. Some lecturers asked questions to the group or individual after presentation and made general comments so they facilitated the presentation and discussion. By contrast, other lecturers selected one of the students in the class as a facilitator of the presentation and discussion. [Interviewee 5] commented that lecturers who used students as facilitators [throughout the classroom presentation and discussion] involved students in a constructive, participative, reflective and critical discussion. For example, one of the lecturers used to employ the constructivist, participative, reflective and critical teaching methods so he organised students in pairs or groups in order to promote a more productive discussion.

[Interviewee 2] in table 10 (see page 80 pointed out that in the discipline of Philosophy of Education students had done a critical review of the work of three authors in which the students criticised their approaches about environmental issues that exist in society since the idea of higher education is to train people who think different types of approaches for better intervention in society. [Interviewee 4] in table 10 added that students had done many assignments which included literature review and research work in the discipline of Educational Research Methods as well as field reports in other disciplines. Furthermore, students were assessed qualitatively on discussion and application of concepts in a written and oral form. In table 10 (see page 80), [Interviewee 1] revealed that:

> *Sometimes, the assessment of literature critique is done through the participation of students during discussion of assignments in which some lecturers give quantitative assessment for the participation of the student during lectures. In this way, the quantitative assessment has created motivation for students to participate in the construction of knowledge.*

In table 11 (see page 82), [Interviewee 4] confirmed that students had done

assignments which consisted of small projects in the discipline to give answer to some issues. For example, students had an assignment last semester to measure a beam. [Interviewee 4] in table 11 exemplified that students wrote a report after doing laboratory essays in some disciplines and… presented the results as assessment activity.

In table 11 (on page 82), [Interviewee 2] claimed that lecturers recommend bibliography that students could acquire the knowledge of the discipline such as manuals, books and others, yet some bibliography supplied by the lecturers could be found in the faculty library, but other bibliography belonged to the lecturers since the faculty library did not have it. In table 11 (see page 82), [Interviewee 3] asserted that:

> *[Students] have had topics to write under the assistance of the lecturers in the project of the discipline and the end of the course project in year 4 although it is rare. In this case, in the project of the discipline, the lecturer gives topics to students and they develop their projects under assistance of the lecturer in the discipline. Whereas, in the end of the course project, the lecturer gives students topics to develop and respective lecturers in the related areas of the topics to assist the students' projects.*

In table 11 (see page 82), [Interviewee 2] added that "in both the discipline and the end of the course projects …the lecturers give [students] assistance and they are open to meet with students for tutoring. Nonetheless, this depends on the need of the students and I believe that if you do not have any doubt, it means that everything is okay…"

[Interviewee 1] in table 11 (see page 82) noted that:

> *Students present some of the project assignments to the whole class, but others the students presented to the lecturer and then they discussed with him. In this context, there were individual project assignments as well as group project assignments. In the former, the student presented his/her assignment before the class and after the*

> *presentation the class and the lecturer asked questions and comments while in the latter, each group presents its work before the class and after presentation, the class asks questions and give some comments. At last, the lecturer also asks questions and gives observations to every single member of the group that presented. In this case, when a member of the group answers a question, the lecturer assesses him/her. Despite the presentation being in groups, the grade is individual and it is according to the performance of the individual member of the group during the presentation and defence. During individual or group presentation, the students sit individually in the classroom.*

In table 11 (see page 82), [Interviewee 5] commented that "I have done literature review and critique, but one of the things that I have noted is that…we read and write everything we find and we consider it as absolutely right since we do not have abilities to analyse and criticise what is written as well as the reliability of the source…." While [Interviewee 3] in table 11 observed that although lecturers taught students how to obtain relevant information and criticise it through the discipline of Introduction to Engineering in which the lecturer provided tools how to study, how to research and others, the lecturers should develop appropriate activities that may help students analyse the literature deeply and criticise it. [Interviewee 5] in table 11 (on page 82) acknowledged that:

> *On account of everything being internet, one of the things that the lecturers always give us attention is that we should not accurately follow everything we find in the internet so we must be critical, but we need a basis to do this. Furthermore, we have to look for information from a variety of authors and we should always use recommended bibliography because it has been assessed….*

In table 11 (see page 82), [Interviewee 1] revealed that, last year [2014], one lecturer gave students a topic at the beginning of the semester in order to develop an assignment as a test. Then the students developed the assignment tutored by the

lecturer during the semester and in about every fortnight the students discussed the project with the lecturer or they sometimes discussed with the class. At the end of the semester, the students submitted their assignments to the lecturer for final assessment and grading.

Table 10: The variable research-tutored and the discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the EELC of the Faculty of Education-UEM

Variable 2: Research-tutored
[Interviewee 2]: At the beginning of a semester, lecturers provide students an analytic plan with bibliography related to discipline in order to write essays, even so, students should research complementary bibliography. Sometimes, depending on the discipline, the lecturer can recommend bibliography of discipline that is being lectured and other related discipline in the area of environmental education.
[Interviewee 3]: I have written essays, for example, I have written an essay about the system of environmental management in Mac Mahon (2M) company and I have written an essay about environmental sustainability and the common topics of essays are related to climate changes, global warming and pollution in general.
[Interviewee 4]: I have presented essays for discussion in the class and I have been assigned the topics of presentation by the lecturer or I have chosen my own presentation topics. Thus, during the course, we write many essays and reports in some disciplines. For example, when we went to the fieldwork in the Limpopo National Park, we were assigned some topics to develop in the field and after few days we presented our assignments to the class and lecturers that were monitoring us.
[Interviewee 1]: We usually do the presentations in seminars and we sit in different ways such in a round table, in groups or individually. However, the recurrent way of sitting during presentation is the individual one while the group or a person presenting stays before the class to do the presentation. Meanwhile, after the presentation, there is a cycle time critical discussion about the presentation as well as contributions. Despite lecturers appeal for suggestions about any topic that has been

presented, often, students leave contributions to make questions to see whether the presenter is competent with the topic or not. In this context, students probably want to reinforce the final assessment the lecturer will give to their fellow student who presented since assessment is the basis in the academy. At last, the lecturer closes the discussion and gives the benchmarks and the summary of the presentation in the sense that we should not be lost.

[Interviewee 5]: The organisation of the discussion for presentation depends on the lecturer. In this case, some lecturers, after presentation, ask questions to the group or individual who presented and facilitate the discussion and, at the end, the lecturer makes some general comments. By contrast, other lecturers select one of the students in the class as a facilitator of the presentation and discussion. In this way, these lecturers involve students in a constructive, participative, reflective and critical discussion. For instance, there was a lecturer who used to employ the constructivist, participative, reflective and critical teaching methods. Thus, he organised students in pairs or groups in order to promote a more productive discussion.

[Interviewee 2]: In the discipline of Philosophy of Education we have done critical review of the work of three authors in which we criticised their approaches about environmental issues that exist in society since the idea of higher education is to train people who think different types of approaches for better intervention in society.

[Interviewee 4]: I have done many written assignments, literature review and research assignments in the discipline of Educational Research Methods as well as reports since in some disciplines we have to do some assignments in the communities in order to understand their environmental behaviour and help them be aware of it. After that, we do field report which is assessed qualitatively. The lecturer assesses students on discussion and application of concepts in a written and oral form. In this case, the lecturers assess the factors and impacts of the concepts. Thus, we must be able to discuss the concepts in the written and oral form and the lecturer assesses these activities.

[Interviewee 1]: Sometimes, the assessment of literature critique is done through the

participation of students during discussion of assignments in which some lecturers give quantitative assessment for the participation of the student during lecturers. The quantitative assessment has created motivation for students to participate in the construction of knowledge.

Table 11: The variable research-tutored and the discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the CELC of the Faculty of Engineering-UEM

Variable 2 Research-tutored
[Interviewee 4]: Some assignments that we have done are small projects in the discipline. For example, we had an assignment last semester to measure a beam. Thus, we have done assignments to give answer to some issues. Usually in some disciplines after doing laboratory essays, we have to write a report and present it, all the same, the essays are discussed at the level of the discipline in the following way: First, we present the essay in the classroom about its importance. Next, we conduct the essays in the laboratory. Finally, we present the results through a report as an assessment activity. [Interviewee 2]: At the beginning of the semester, some lecturers recommend some bibliography in which we can find the necessary information to do the subject and acquire the basic knowledge of the discipline. In this context, the lecturers provide the main and the secondary bibliography such as manuals, books and others, yet some bibliography supplied by the lecturers can be found in the faculty library, but other bibliography belongs to the lecturers since the faculty library does not have it. [Interviewee 3]: The lecturers recommend some manuals that have been used by some designers or advise students to research bibliography by themselves. Moreover, the lecturers suggest bibliography that can help students to master the knowledge of the discipline or rather to understand issues of the discipline. [Interviewee 3]: We have had topics to write under the assistance of the lecturers in the project of the discipline and the end of the course project in year 4 although it is rare. In this case, in the project of the discipline, the lecturer gives a topic to students

and they develop their projects under assistance of the lecturer in the discipline.

[Interviewee 2]: In both the discipline and the end of the course projects, the lecturers are available to give students assistance whenever the students need. That is, the lecturers give us assistance and they are open to meet with students for tutoring. Nonetheless, this depends on the need of the students and I believe that if you do not have any doubt, it means that everything is okay. In other words, the meeting between students and lecturers occurs according to difficult that the student has with his or her work even though the student sometimes does not know whether he/she is in a good track or not.

[Interviewee 1]: We present some of the project assignments to the whole class, but others we present to the lecturer and then we discuss with him. In this context, there are individual project assignments as well as group project assignments. In the former, the student presents his/her assignment before the class and after presentation the class and the lecturer ask questions and give comments while in the latter, each group presents its work before the class and after presentation, the class asks questions and give some comments. At last, the lecturer also asks questions and gives observations to every single member of the group that presented. In this case, when a member of the group answers a question, the lecturer assesses him/her. Despite the presentation being in groups, the grade is individual and it is according to the performance of the individual member of the group during the presentation and defence. During the individual or group presentation, the students sit individually in the classroom.

[Interviewee 3]: I have done literature review and critique, but one of the things that I have noted is that sometimes we read and write everything we find and we consider it as absolutely right since we do not have abilities to analyse and criticise what is written as well as the reliability of the source. Notwithstanding, the lecturer has demonstrated A and B that this is according to what you have actually found, but it should be like this.

[Interviewee 3]: I think that the lecturers should not demand critical literature review as such, but they should develop appropriate activities that may help students analyse

the literature deeply and criticise it. Although lecturers teach us how to obtain relevant information and criticise it through the discipline of Introduction to Engineering in which the lecturer gives tools how to study, how to research and others.

[Interviewee 5]: On account of everything being internet, one of the things that the lecturers always give us attention is that we should not accurately follow everything we find in the internet so we must be critical, but we need a basis to do this. Furthermore, we have to look for information from a variety of authors and we should always use recommended bibliography because it has been assessed. For instance, some sites of internet which have some reliable articles. In short, the lecturers advise us that we should assess, analyse and criticise the literature and they do assessment on these activities.

[Interviewee 1]: Even though the lecturers rarely give topics at the beginning of the semester to develop throughout the semester, last year [2014], one lecturer gave us a topic at the beginning of the semester in order to develop an assignment as a test. Then we developed the assignment tutored by the lecturer during the semester and in about every fortnight we discussed the project with the lecturer or we sometimes discussed with the class. At the end of the semester, we submitted our assignments to the lecturer for final assessment and grading.

4.3.2 Data presentation of the variable research-tutored from the semi-structured qualitative interview with lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section is concerned with the data presentation of the variable research-tutored gathered from the qualitative semi-structured interviews conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM related to activities that lecturers use for involvement of their students in discussion or analysis of academic essays or papers. The data are presented in table 12 and table 13 (see pages 88 and 90 respectively).

In table 12 (on page 88, [Interviewee 3] admitted that “development and presentations

of essays were one of the compulsory components during and at the end of the semester. Therefore, all subjects that had essays were interactive through presentations. In this case, my students conducted more assignments in groups so that they could have a variety of ideas and space for discussion.

[Interviewee 1] in table 12 (see page 88), explained that:

> *The essays that students develop are classified into two parts namely the development of the report and its presentation....The presentation of essays is done in groups and during the presentation the class is an audience. After presentation of each group, the class asks questions and gives contributions in different perspectives about the topic presented. In this way, the discussion starts and all of us discuss in a seminar way where we sit in a form of a round table….My intervention is at the end of the discussion.*

In table 12 (on page 88); [Interviewee 2] noted that in the discipline that he lectured he assigned topics to students in order to write essays. Then students presented and defended their essays in groups and in seminars, but he monitored how students approached the concepts. Furthermore, in the discipline of research methods, students had their own research topics to write. Nevertheless, the research methods were taught in the first year of the course, consequently, students were not expected to produce research projects instead they were supposed to produce a research protocol of their optional research topics. The lecturer monitored students how they organised their work in different stages of the research protocol. In addition, students in year 4 wrote monographs from a list of topics proposed by the lecturer or from optional topics of the students and the lecturers met with the students once a week for tutoring.

In table 12 (see page 88), [Interviewee 1] asserted that he had provided students basic and complementary literature of the discipline which was aimed to integrate students in the discipline and introduce or guide the knowledge of the discipline. In table 12, [Interviewee 2] revealed that lecturers gave students the basic bibliography and topics. After that, the lecturers instructed students to work in small groups for writing of assignments, presentation and defence. Furthermore, lecturers gave students

bibliography to read about many topics and summarise the information in worksheets….The worksheets had stimulated students for discussion.

In table 12 (see page 88), [Interviewee 3] commented that:

> *I teach my students how to do literature review and critique. However, I have noted that when students do literature review, they do not question the literature and they do not adapt the literature to our reality as most literature is Brazilian. Despite lecturers demanding students to do literature review and critique as well as the correct use of citations and bibliography, students have many problems concerning with these issues. Instead of doing literature review and critique, students, mainly from year 1, year 2, and year 3, read and transcribe information specifically from internet and sometimes students do not write the reference in their work. Furthermore, during the literature review, students do not discuss concepts with more than two or three authors who could help students develop a variety of ideas and critical thinking.*

In table 12 (see page 88), [Interviewee 2] believed that "assessment of students on writing and presentation of essays is one of the main pillars of our course…. I assess students on the level of the answers given and their scholarship….I give more priority to group assessment so that students can have space to discuss knowledge in seminars….I have also assessed the development of concepts…." In table 12 (on page 88), [Interviewee 3] added that "during teaching-learning process, [lecturers] have [devised] qualitative assessment in order to stimulate the participation of the students during lectures. As a consequence, qualitative assessment turns into quantitative at the end of the semester so that we can stimulate students to be the centre of teaching learning process."

Whereas, In table 13 (see page 90), [Interviewee 3] acknowledged that he focused more on presentations of laboratory assignments in the discipline that he lectured and the presentations were done in groups, but he had subdivided the stream into groups of 10-9 students because the average streams was between 60-70 students. During the

presentation of the groups, the rest of the class was an audience. After the presentation of each group, the lecturer asked the class to raise questions, doubts or request for clarification of some issues concerned with the presentation. Finally, the lecturer asked questions and made comments about the presentation of the group.

In table 13 (see page 90), [Interviewee 2] emphasised that:

> *There are assignments that have been done as the end of the course projects during the semester. In this case, students are given course projects assignments at the beginning of the semester and these projects are monitored by the lecturer. Whenever there are related disciplines, we collaborate with other lecturers from other disciplines. For example, I can have an issue that I would like my student to develop but it involves concepts or knowledge from other disciplines so the student can consult other lecturers although it is not common. By contrast, the project of the discipline consists of lectures and assignments that students conduct. During the development of the project of the discipline doubts appear, thus students are given space to raise their doubts at the end of the lecture or on the agreed time between the lecturer and students….*

In table 13 (see page 90), [Interviewee 1] revealed that he presented the basic bibliography and methods of assessment at the beginning of the semester. [Meanwhile], during the semester he provided students bibliography from slides of his presentation and [handouts from] a workbook or a handbook which was the basic manual of the discipline. Furthermore, he provided students bibliography that could help them acquire knowledge in the discipline and develop their worksheets in order to discuss in the classroom. In table 13 (on page 90), [Interviewee 2] pointed out that "in regard to the end of the course project assignments, [lecturers] have recommended many materials for literature review, yet the students should research bibliography by themselves…. this creates reading and research culture of the students."

In table 13 (see page 90), [Interviewee 3] observed that "…[lecturers] have criticised students regarding to literature review since the students like going directly to the

objective…they do not deeply discuss what is around the problems….although students do research and find out some answers, the sources are not reliable and others contain errors."

In table 13 (see page 90), [Interviewee 1] noted that:

> *In the discipline that I lecture we have presentations and oral exams as assessment activities. In this kind of activities, I have assessed not only the level of knowledge but also attitudes of the student, his/her determination and the command of content knowledge of the discipline. Usually, the written work has quantitative and qualitative assessment. Qualitative assessment aims to analyse the strong and weak points of the commitment of the student with learning process and give them advice.*

[Interviewee 3] in table 13 (on page 90) asserted that students did individual or group written work and oral presentations as assessment activities.

Table 12: The variable research-tutored and the discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in the EELC of the Faculty of Education-UEM

Variable 2: Research-tutored
[Interviewee 3]: Development and presentations of essays is one of the compulsory components during and at the end of the semester. Therefore, all subjects that have essays are interactive through presentations. In this case, my students conduct more assignments in groups so that they can have a variety of ideas and space for discussion.
[Interviewee 3]: The essays that students develop are classified into two parts namely the development of the report and its presentation. In this context, the presentation of essays is done in groups and during the presentation, the class is an audience. After presentation of each group, the class asks questions and gives contributions in different perspectives about the topic presented. In this way, the discussion starts and all of us discuss in a seminar way where we sit in a form of a round table. However,

often, my intervention is at the end of the discussion.

[Interviewee 2]: In the discipline that I lecture I assign topics to students in order to write essays. After that, students present and defend their essays in groups and in seminars, but I monitor how students approach the concepts. Furthermore, in the discipline of research methods, every single student has his/her research topic to develop. Nevertheless, the research methods are taught in the first year of the course, consequently students do not necessarily produce research projects instead they produce a research protocol of their optional research topics. In this context, I monitor students how they organise their work in different stages of the research protocol. For development of monographs [end of the course projects or capstone projects], the lecturers propose a list of topics for students to write their monographs, but we also allow students to propose their own research topics in the area of the study. Likewise, we have supervised monographs of the students in year 4 so during this period we meet with students once a week for tutoring.

[Interviewee 1]: I have provided students basic literature of the discipline and the same literature can be used to develop other assignments in the discipline. Besides, in analytic plan, we put the main and secondary bibliography. The main bibliography is aimed to integrate students in the discipline and introduce or guide the knowledge of the discipline.

[Interviewee 2]: We provide the main bibliography and discussion topics. Then we divide students in small groups to write assignments and do oral presentation and defence. In this case, we give students bibliography to read about many topics and summarise the information in worksheets. For example, before discussing any topic, students should bring their worksheets as a basis for discussion. In this way, the worksheets stimulate students for discussion.

[Interviewee 3]: I teach my students how to do literature review and critique. However, I have noted that when students do literature review, they do not question the literature and they do not adapt the literature to our reality as most literature is Brazilian. Despite lecturers demanding students to do literature review and critique as

well as the correct use of citations and bibliography, students have many problems concerning with these issues. Instead of doing literature review and critique students, mainly from year 1, year 2, and year 3, read and transcribe information specifically from internet and sometimes students do not write the reference in their work. Furthermore, during the literature review, students do not discuss concepts with more than two or three authors who could help students develop a variety of ideas and critical thinking.

[Interviewee 2]: Assessment of students on writing and presentation of essays is one of the main pillars of our course. Thus, students write and present their essays in the classroom and as a stimulus I assess the written test and the oral one. During presentation of essays I assess students on the level of the answers given and their scholarship. Nevertheless, I give more priority to group assessment so that students can have space to discuss knowledge in seminars. In this context, I have also assessed the development of concepts, that is to say, how the students discuss the concepts into practice. Likewise, I have assessed how students follow the recommended steps for development of assignments such as survey, questionnaires and discussion of results.

[Interviewee 3]: During teaching-learning process, we have done qualitative assessment in order to stimulate the participation of the students during lectures. As a consequence, qualitative assessment turns into quantitative at the end of the semester so that we can stimulate students to be the centre of teaching learning process.

Table 13: The variable research-tutored and the discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in the CELC of the Faculty of Engineering-UEM

Variable 3: Research-tutored
[Interviewee 3]: In the discipline that I lecture, I give priority to presentations such as presentation of laboratory assignments and the presentations are done in groups, but as the streams are large ones, which vary between 60-70 students so the class is subdivided into small groups of 9-10 students. In this context, the groups do presentations one at a time, even so, every single member of the group is responsible for presenting his/her own part and he/she should master the knowledge of the whole

presentation of the group for possible questions that can be asked to the group in general. While the group is presenting its assignments before the class, the rest of the class is an audience, but after the presentation of the group, I give the class opportunities to raise questions, doubts or request for clarification of some issues. At last, I raise my questions and I give final considerations or points of view about the presentation done by the group.

[Interviewee 2]: There are assignments that have been done as the end of the course projects during the semester. In this case, students are given course projects assignments at the beginning of the semester and these projects are monitored by the lecturer. Whenever there are related disciplines we collaborate with other lecturers from other disciplines. For example, I can have an issue that I would like my student to develop but it involves concepts or knowledge from other disciplines so the student can consult other lecturers although it is not common. By contrast, the project of the discipline consists of lectures and assignments that students conduct. During the development of the project of the discipline, doubts appear, thus students are given space to raise their doubts at the end of the lecture or on the agreed time between the lecturer and students. Then lecturer makes arrangements to meet with the students in order to clarify doubts.

[Interviewee 1]: At the beginning of the semester, I present the main bibliography and methods of assessment and throughout the semester I have provided students bibliography that includes slides from power point after my presentation. Also, I have provided students a workbook or handbook which is a basic manual of the discipline. Furthermore, I have given students complementary hardcopy and electronic bibliography that I regard as fundamental for students to acquire knowledge in the discipline and develop their worksheets in order to facilitate the comprehension of issues discussed in the classroom.

[Interviewee 2]: In regard to the end of the course project assignments, we have recommended many materials for literature review, yet the students should research bibliography by themselves. Moreover, I advise my students not only to read literature in the local library but also to read literature from the internet and present

questions or doubts in the classroom to enrich the lectures and students themselves. As a result, this creates reading and research culture of the students.

[Interviewee 3]: We have done literature review, for example, we have produced handouts and workbooks. However, we have criticised students regarding to literature review since the students like going directly to the objective. As a consequence, they do not deeply discuss what is around the problems. In addition, although students do research and find out some answers, the sources are not reliable and others contain errors.

[Interviewee 1]: In the discipline that I lecture which is the End of the Course Projects, we have presentations and oral exams as assessment activities. In this kind of activities, I have assessed not only the level of knowledge but also attitudes of the student, his/her determination and the command of content knowledge of the discipline. Usually, the written work has quantitative and qualitative assessment. Qualitative assessment aims to analyse the strong and weak points of the commitment of the student with learning process and give them advice.

[Interviewee 3]: The assignments developed during the course consist of written work and oral presentations, but their assessment depends on the dimensions of the assignment. In this case, if it is an individual work, the student submits his/her work to the lecturer for marking. On the contrary, if it is a group work, the group does oral presentation and defence and then the lecturer assesses it. After that, the lecturer gives marks for the written and oral presentation.

4.3.3 Data presentation of the variable research-tutored from the documentary analysis of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section presents the data of the variable research-tutored gathered from the qualitative documentary analysis of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM and the data are displayed in table 14 (see page 93) and table 15 (see page 94).

Tables 14 and 15 (on pages 93 and 94 respectively) indicate the curriculum discourses of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. As can be seen in tables 14 and 15, there were differences of teaching-learning activities and assessment that students undertook in the EELC and CELC. As revealed in table 14 (on page 93), students were expected to undertake teaching-learning activities which involved tutorial groups, workshops, lectures, essays, seminars, case study analysis, directed reading, home assignments, tutoring…. At the same time, the assessment of students consisted of discussion of reports in groups/tutorial groups, self-study assignment and qualitative assessment on participation of the students in lectures. Likewise, the assessment included academic writing, individual and group presentation of assignments and peer review monitored by the lecturer as well as qualitative assessment of generic skills, presentation of the fieldwork reports and supervision of monographs.

By contrast, the data in table 15 (see page 94) indicated that students undertook teaching-learning activities that consisted of group work for project studies, construction, use and maintenance of construction works.

Table 14: The variable research-tutored and the curriculum discourse of the EELC of the Faculty of Education-UEM

	Variable 2: Research-tutored
Teaching-learning methods	The teaching learning-methods were centred on the student. These methods included active participation of the student and critical thinking and the student was an agent of intervention and change through his/her curiosity, creativity and autonomy during teaching and learning process.
Teaching-learning activities	Teaching-learning activities included tutorial groups, Teaching-learning activities included tutorial groups, workshops, lectures, essays, seminars, case study analysis, directed reading, home assignments, tutoring and 'jornadas científicas'. Besides, the undergraduate students were supposed to be autonomous, cooperative and work in groups for sharing experience.

Assessment	Assessment involved discussion of reports in groups/tutorial groups, self-study assignment and qualitative assessment on participation of the students in lectures as well as assessment of academic writing, individual and group presentation of assignments and peer review monitored by the lecturer. Likewise, assessment comprised qualitative assessment of generic skills, fieldwork reports and supervision of monographs.

Table 15: The variable research-tutored and the curriculum discourse of the CELC of the Faculty of Engineering-UEM

	Variable 2: Research-tutored
Teaching-learning methods	No description of teaching-learning methods.
Teaching-learning activities	Teaching-learning activities consisted of group work for project studies, construction, use and maintenance of construction works.
Assessment	The assessment included development and presentation of laboratory essays or essay reports.

4.3.4 Data presentation of the variable research-tutored from questionnaires conducted to students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section provides the data of the variable research-tutored obtained through quantitative questionnaires conducted to year four undergraduate students from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM concerning with students' feelings, perceptions or practices regarding to how the students learn about a research process in attempt to integrate teaching and research in the courses previously mentioned. The data are displayed in table 16 (see page 96).

Table 16 (on page 96) shows the percentages of students in the EELC of the Faculty of Education and the percentage of students in the CELC of the Faculty of

Engineering at UEM in relation to learning about a research process specifically reading and writing as well as presentation of academic essays. At the same time, learning about a research process includes students' involvement in discussion or critical analysis of essays or papers and assessment on the research process. In this case, the data indicated that 82.2% of students in the EELC of the Faculty of Education and 69.5% of students in the CELC of the Faculty of Engineering at UEM used bibliography recommended by their lecturers to produce academic essays or papers (see table 16 on page 96). Likewise, the data from table 16 revealed that 69.5% of students in the EELC and 78.2% of students in the CELC produced academic essays based on bibliographical guidance provided by their lecturers. Besides, 82.6% of students in the EELC and 60.9% of students in the CELC presented academic essays individually for class discussion while 100% of students in the EELC and 95.6% of students in the CELC presented academic essays or papers in groups for class discussion (see table 16). Moreover, 78.3% and 79.1% of students in the EELC as well as 86.9% and 78.3% of students in the CELC were assessed on writing and presenting academic essays respectively (see table 16).

Table 16: The variable research-tutored from the questionnaires conducted to students in the EELC of the Faculty of Education and CELC of the Faculty of Engineering-UEM

Learning about research process (N=23)

	EELC of the Faculty of Education					**CELC of the Faculty of Engineering**				
	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	DS (f/%)	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)
X9	4 (17.4)	15 (65.2)		2 (8.7)	2 (8.7)	7 (30.4)	9 (39.1)	5 (21.7)	2 (8.7)	
X10	4 (17.4)	3 (13.0)	3 (13.0)	7 (30.4)	6 (26.1)	6 (26.1)	8 (34.8)	3 (13.0)	3 (13.0)	3 (13.0)
X11	1 (4.3)	4 (17.4)	2 (8.7)	9 (39.1)	7 (30.4)	10 (43.5)	8 (34.8)	1 (4.3)	1 (4.1)	3 (13.0)
X12	5 (21.7)	11 (47.8)		3 (13.0)	4 (17.4)	5 (21.7)	13 (56.5)	2 (8.7)	3 (13.0)	
X13		3 (13.0)	6 (26.1)	8 (34.8)	6 (26.1)	7 (30.4)	9 (39.1)	3 (13.0)	1 (4.3)	3 (13.0)
X14	13 (56.5)	6 (26.1)	1 (4.3)	2 (8.7)	1 (4.3)	4 (17.4)	10 (43.5)	5 (21.7)	2 (8.7)	2 (8.7)
X15	12 (52.2)	11 (47.8)				7 (30.4)	15 (65.2)	1 (4.3)		
X16	7 (30.4)	12 (52.2)	2 (8.7)		2 (8.7)	3 (13.0)	13 (56.5)	4 (17.4)	2 (8.7)	1 (4.3)
X17		4 (17.4)	1 (4.3)	11 (47.8)	7 (30.4)	1 (4.3)	7 (30.4)	3 (13.0)	6 (26.1)	6 (26.1)
X18	2 (8.7)	12 (52.2)	5 (21.7)	1 (4.3)	3 (13.0)		8 (34.8)	7 (30.4)	4 (17.4)	4 (17.4)
X19	8 (34.8)	10 (43.5)	4 (17.4)	1 (4.3)		7 (30.4)	13 (56.5)		1 (4.3)	2 (8.7)
X20	9 (39.1)	9 (39.1)	2 (8.7)	1 (4.3)	2 (8.4)	10 (43.5)	8 (34.8)	3 (13.0)	1 (4.3)	1 (4.3)
X21	1 (4.3)	3 (13.0)	6 (26.1)	8 (34.8)	5 (21.7)		5 (21.7	1 (4.3)	8 (34.8)	9 (39.1)
X22	3 (13.0)	7 (30.4)	2 (8.7)	6 (26.1)	5 (21.7)	1 (4.3)	3 (13.0)	5 (21.7)	5 (21.7)	9 (39.1)

SA = Strongly agree; A = Agree; NAND = Neither agree Nor disagree; D = Disagree; SD = Strongly disagree

N = Number of respondents in each course; f = frequency; % = percentage

X9 - You are recommended by your lecturer(s) in order to do academic essays or papers during your course.

X10 - During your course, you are assigned writing topics with a tutor (supervisor) from your course or a tutor from outside your course.

X11 - You write academic essays or papers in pairs or groups assisted by your lecturer or tutor.

X12 - You produce academic essays or papers based on bibliographical guidance provided by the lecturer.

X13 - You meet individually or in groups with your lecturer or tutor once a week or a fortnight for tutorials of essay or paper writing.

X14 - You present academic essays or papers individually for class discussion.

X15 - You present academic essays or papers in pairs or groups for class discussion.

X16 - You do critical analysis of academic essays or papers.

X17 - You do tutoring (supervision) of your fellow students' academic essays or papers.

X18 - You do literature review and critique.

X19 - You are assessed on writing of academic essays or papers.

X20 - You are assessed on oral presentation of academic essays or papers.

X21 - You are assessed on tutoring (supervision) of your fellow students' academic essays or papers.

X22 - You are assessed on literature review and critique.

4.3.5 Data presentation of the variable research-tutored from questionnaires conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section presents the data of the variable research-tutored gathered from quantitative questionnaires conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. The data are related to lecturers' feelings, perceptions or practices concerning with how the lecturers involved their students in learning about a research process in order to integrate teaching and research in the courses mentioned earlier and the data are presented in table 17 (see page 99).

Table 17 (on page 99) gives the percentages of lecturers in the EELC of the Faculty of Education and the percentage of lecturers in the CELC of the Faculty of Engineering in connection to learning about a research process namely reading and writing as well as presentation of academic essays. Likewise, learning about research process includes students' involvement in discussion or critical analysis of essays or papers and assessment on the research process.

As can be seen from the data in table 17 (on page 99), 71.4% of lecturers in the EELC and also 71.4% of lecturers in the CELC gave their students compulsory bibliography in order to read and produce academic essays. At the same time, 85.2% of lecturers in the EELC and 85.8% of lecturers in the CELC assigned topics to the students

individually or in groups for writing essays under their tutorial or tutorial of other lecturers (see table 17). In addition, the data from table 17 indicated that 57.2% of lectures in the EELC and 85.7% of lecturers in the CELC met with their students individually or in groups once a week or a month for tutorial of essay writing.

As revealed in table 17 (see page 99), 57.1% of lecturers in the EELC and 71.5% of lecturers in the CELC engaged their students in literature review and critique. Furthermore, 71.5% of lecturers in the EELC and 100% of lecturers in the CELC involved their students in presentation of academic essays in pairs or in groups for class discussion. Likewise, the data from table 17 demonstrated that 71.5% and 100% of lecturers in the EELC as well as 85.8% and 85.7% of lecturers in the CELC assessed their students on writing and oral presentation of academic essays respectively.

Table 17: The variable research-tutored from the questionnaires conducted to students in the EELC and the CELC of the Faculty of Education and the Faculty of Engineering-UEM

Students learn about a research process (n=7)

	EELC of the Faculty of Education					CELC of the Faculty of Engineering				
	SA (f/%)	A (f/%)	NAND (f/%)	SD (f/%)	D (f/%)	SA (f/%)	A (f/%)	NAND (f/%)	SD (f/%)	D (f/%)
X9	2 (28.6)	2 (28.6)		1 (14.3)	2 (28.6)	1 (14.3)	4 (57.1)		2 (28.6)	
X10	1 (14.3)	4 (57.1)		1 (14.3)	1 (14.3)		5 (71.4)	2 (28.6)		
X11	4 (57.1)	2 (28.1)	1 (14.3)			3 (42.9)	3 (42.9)	1 (14.3)		
X12	3 (42.9)	1 (14.3)	1 (14.3)	1 (14.3)	1 (14.3)	1 (14.3)	5 (71.4)	1 (14.3)		
X13	3 (42.9)	1 (14.3)	3 (42.9)			1 (14.3)	1 (14.3)	4 (57.1)	1 (14.3)	
X14	3 (42.9)	2 (28.6)	2 (28.6)			2 (28.6)	5 (71.4)			
X15	1 (14.3)	1 (14.3)	2 (28.6)	2 (28.6)	1 (14.3)			3 (42.9)	2 (28.6)	2 (28.6)
X16		4 (57.1)		1 (14.3)	2 (28.6)		2 (28.6)	3 (42.9)	1 (14.3)	1 (14.3)
X17	4 (57.1)	1 (14.3)	2 (28.6)			3 (42.9)	3 (42.9)	1 (14.3)		
X18	3 (42.9)	4 (57.1)				2 (28.6)	4 (57.1)	1 (14.3)		
X19	1 (14.3)	1 (14.3)	1 (14.3)	3 (42.9)	1 (14.3)			1 (14.3)	1 (14.3)	5 (71.4)

SA = Strongly agree; A = Agree; NAND = Neither agree Nor disagree; D = Disagree; SD = Strongly disagree

N = Number of respondents in each course; f = frequency; % = percentage

X9 - You recommend bibliography for your students to read and produce academic essays or papers.

X10 - You provide a list of a compulsory bibliography for your students to read and produce academic essays or papers.

X11 - You assign your students writing topics in pairs or groups under your tutorial (supervision) or tutorial of other lecturers.

X12 - You meet with your students individually or in groups once a week/month for tutorial.

X13 - Your students present academic essays or papers individually for class discussion.

X14 - Your students present academic essays or papers in pairs or groups for class discussion.

X15 - Your students do critical analysis of their partners' academic essays or papers as a tutorial task

X16 - Your students do literature review and critique.

X17 - You assess your students on writing of academic essays or papers.

X 18 - You assess your students on oral presentation of academic essays or papers.

X19 - You assess your students on tutorial of their fellow students' academic essays or papers.

4.3.6 Summary of the data from the variable research-tutored in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

Generally, students in the EELC of the Faculty of Education and students in the CELC of the Faculty of Engineering were engaged in writing, presentation and discussion of essays as well as assessment of essays. In both EELC and CELC, lecturers assigned students topics to write and present academic essays in groups for class discussion based on bibliographical guidance provided by the lecturers. Meanwhile, students in the EELC and CELC lacked abilities to question or criticise the literature and adapt it to reality, as a result, this led to surface learning which is the main attribute of research-led (see figure 6 on page 39). Conversely, during presentation and discussion of essays, the lecturers employed the student-centred method to teaching in which the lecturer facilitated the presentation and discussion of the essays. Although students were engaged in writing, presentation and discussion as well as assessment of academic essays which are main indicators of integrating teaching and research through the variable research-tutored outlined in figure 5 (see page 37), the way how the academic essays were developed lacked scholarship since students did not question or criticise the literature and adapt it to reality.

4.4 Data presentation of the variable research-oriented

This section focuses on the data presentation of the variable research-oriented. The section presents, compares and contrasts the data obtained through three research methods such as semi-structured qualitative interview, qualitative documentary analysis and quantitative questionnaire conducted to year 4 students and their lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. The section is subdivided into three sub-sections. The first sub-section is related to the data presentation of the variable research-oriented from the semi-structured qualitative interview. The second sub-section is concerned with the

data presentation of the variable research-oriented from the documentary analysis and the third sub-section is regarded to the data presentation of the variable research-oriented from the questionnaire.

4.4.1 Data presentation of the variable research-oriented from the semi-structured qualitative interview with students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section presents the data of the variable research-oriented from the semi-structured interviews with students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM related to knowledge construction in the discipline in order to integrate teaching and research in the courses already stated and the data are displayed in tables 18 and 19 (see pages 102 and 103 respectively).

As can be seen from table 18 (on page 103), [Interviewee 5] acknowledged that:

> *The lecturers have created scenarios of real life problems in the area of the study for students to discuss and the topics are related to different environmental problems in Mozambique. Nonetheless, the creation of scenarios for discussion depends on the discipline, yet some specific lecturers bring these kinds of scenarios for discussion mainly in the discipline of Didactics of Materials as well as Natural Sciences and Environmental impacts. For example, we had simulation in the subject of Natural Sciences and Environmental Impacts concerning with the situation of some negative environmental practices in the community for students to discuss. In this case, the main purpose of this activity was to bring new information to the citizen about positive environmental practices. During this activity, in the discipline of Environmental Impacts we were divided into groups and we were given some worksheets with a scenario about the assessment of the environmental impact to discuss possible steps to take for mitigation of the situation.*

In table 18 (see page 102), [Interviewee 2] pointed out that students usually discussed the topics in groups or in a round table and sometimes they discussed the topics

individually. The lecturers assessed students on solving real life problems, for example, in the discipline of Didactics of Materials.

Similarly, in table 19 (on page 102), [Interviewee 1] emphasised that:

> *Some lecturers bring situations or scenarios about real life problems in civil engineering. For example, the lecturers present a situation about a landslide in place x or damage of a road and possible causes and students discuss possible solutions to avoid this type of situation….lecturers challenge students with real situations for difficult problems of development in the field of civil engineering as well as possible causes of building pathologies in Maputo City.*

In table 19 (see page 103), [Interviewee 4] revealed that "lecturers bring pictures or videos to the class or they take us to a study visit and try to explain issues in the discipline…. in general and also raise issues that we should know and pay attention." Furthermore, in table 19 (on page 103), [Interviewee 2] asserted that students did an assignment in groups this semester about the investigation of a road network…. In this assignment, each group had to investigate one of the layers of the road. Then, the groups presented their assignments one at a time and after that the class discussed the presentation of each group. Finally, the lecturers gave their comments about the presentations. Meanwhile, the purpose of this assignment was to discuss the knowledge of the discipline, but it was not assessed.

Table 18: The variable research-oriented and the discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the EELC of the Faculty of Education-UEM

Variable 3: research-oriented
[Interviewee 5]: The lecturers have created scenarios of real life problems in the area of the study for students to discuss and the topics are related to different environmental problems in Mozambique. Nonetheless, the creation of scenarios for discussion depends on the discipline, yet some specific lecturers bring these kinds of scenarios for discussion mainly in the discipline of Didactics of Materials as well as Natural Sciences and Environmental impacts. For example, we had simulation in the

subject of Natural Sciences and Environmental Impacts concerning with the situation of some negative environmental practices in the community for students to discuss.

[Interviewee 3]: We were given some worksheets with a scenario about the assessment of the environmental impact to discuss possible steps to take for mitigation of the situation. We usually discuss the topics in groups or in a round table and sometimes we discuss the topics individually. The lecturers assess students on solving real problems, for example in the discipline of Didactics of Materials.

Table 19: The variable research-oriented and the discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the CELC of the Faculty of Engineering-UEM

Variable 3: Research-oriented
Interviewee 1: Some lecturers bring situations or scenarios about real life problems in civil engineering. For example, the lecturers present a situation about a landslide in place x or damage of a road and a possible cause and we discuss possible solutions to avoid this type of situation. For instance, in the discipline of concrete structures we have been challenged with real situations for difficult problems of development in the field of civil engineering as well as possible causes of building pathologies in Maputo City. Whereas, in the discipline of Soil Mechanics we investigate possible solutions and parameters that we need to determine the structures to be installed. Interviewee 4: The lecturers bring problems of the society in the field of engineering in order to integrate our studies with professional life. Nevertheless, we have had those assignments of do this, do that or calculate a support x but students sometimes do not understand because there is no real data. Furthermore, the lecturers bring pictures or videos to the class or they take us to a study visit and try to explain issues in the discipline in general and also raise issues that we should know and pay attention. Interviewee 2: This semester, we did an assignment in groups that aimed to investigate the road network. In this case, each group had to investigate one of the layers of a road. Then each group presented its assignment before the class and after

that, the class discussed the presentation of the group. Finally, the lecturers provided their comments. Although the purpose of this assignment was to discuss the knowledge of the discipline, it was not assessed.

4.4.2 Data presentation of the vaiable research-oriented from the semi-structured qualitative interview with lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section provides the data of the variable research-oriented gathered from the semi-structured interviews with year four lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM concerning with knowledge construction in the discipline in order to integrate teaching and research in the courses stated before. The data are presented in table 20 and table 21 (see page 106 and 107 respectively).

In table 20 (on page 106), [Interviewee 3] believed that "creation of scenarios or situations for discussion in the class depends on the discipline. In the discipline that I lecture,… I create scenarios and I raise a daily situation about environmental education, for example how you would involve a community in situation x."

In table 20 (see page 106), [Interviewee 1] explained that:

> *Disciplines that require problematisation namely the discipline of Community Management, Environmental Education and Research Methods. Problematisation is how the students approach the problem, raise issues and analyse the problem in a scientific way so this is the problematisation that I deal with… the discipline of Community Management involves discussion of participative management. Thus, I create situations to engage students in discussion while in the discipline of Environmental Education we are concerning with assessment of environmental impacts about a variety of daily or real life environmental problems, for instance, the urban waste management and the preservation of flora and fauna. Similarly, we discuss how an environmental educator should behave and link environmental impacts in different areas such as agriculture, health*

and infrastructures in Mozambique as the climate changes in this country create hardship in different areas especially in health where the climate changes cause many diseases. Furthermore, our topics for discussion include floods that affect agriculture. In this case, we have discussed the problem of floods in attempt to find out possible solutions to mitigate this problem.

According to [Interviewee 2] in table 20 (see page 106), lecturers had assessed their students on discussion and solutions of environmental problems during fieldwork activities. The lecturers had taken students to the field in order to live the real situation of physical planning such as community ordering and this led them to discuss how people had been resettled in the community and analyse whether there is physical planning or not. Likewise, the lecturers devised qualitative assessment on the fieldwork activities such as interviews and they supervised students' fieldwork.

Similarly, in table 21 (see page 107), [Interviewee 1] observed that:

We have created scenarios about real life problems in the discipline for students to discuss….We fit the scenarios to the reality of our cities country and other countries. For instance, we question about works of engineering that are reported in the media at national and international level…. We try to integrate theoretical problems from literature with practice.

In table 21 (see page 107), [Interviewee 3] claimed that lecturers had created scenarios for students to analyse and discuss problems and real culture of engineering as way of understanding the views of students associated with their level of knowledge acquired as well as the solutions or alternatives that students could give to certain problems that happened in daily life. For example, in the assignments of the final course projects that the lecturer supervised, students had focused on components of problems and real culture specifically the use of limestone for low cost of construction works, recycling of materials such as rubble, maintenance and security of bridges. As a result, these topics about real life problems had motivated students to do more analysis and deep discussion rather those topics from unreal problems.

In table 21 (see page 107), [Interviewee 2] noted that:

> *The lecturers usually give scenarios such as let us suppose that a bridge under a river was damage during the floods so what you should do to avoid the collapse of the bridge. In this case, the lecturer asks students to give their opinions individually and at the end he/she summarises all contributions from the students and analyses what it is near the feasible solution. Then the lecturer comments on various aspects of the problem solution practicability. However, lecturers sometimes raise a question for student to discuss in self-study and they present their work in the following lecture for discussion.*

In table 21 (see page 107), [Interview 3] asserted that "assessment of students on a problem solution is more concerned with qualitative analysis….the lecturer can challenge students with an activity … as a project of the discipline….this kind of project aims to stimulate students' creativity and bring new functional solutions in which there is establishment of a set of rules and formulas…."

Table 20: The variable research-oriented and the discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in the EELC of the Faculty of Education-UEM

Variable 3: Research-oriented
[Interviewee 3]: Creation of scenarios or situations for discussion in the class depends on the discipline. In the discipline that I lecture, which is Climates and Climates Changes, I have linked problems of climate and how people react to this kind of problems through discussion in the class. In this context, I create scenarios and I raise a daily situation about environmental education, for example how you would involve a community in a situation x. [Interviewee 1]: …Disciplines that require problematisation namely the discipline of Community Management, Environmental Education and Research Methods. Problematisation is how the students approach the problem, raise issues and analyse the problem in a scientific way so this is the problematisation that I deal with. In this context, the discipline of Community Management involves discussion of

participative management. Thus, I create situations to engage students in discussion while in the discipline of Environmental Education we are concerning with assessment of environmental impacts about a variety of daily or real life environmental problems, for instance the urban waste management and the preservation of flora and fauna. Similarly, we discuss how an environmental educator should behave and link environmental impacts in different areas such as agriculture, health and infrastructures in Mozambique as the climate changes in this country create hardship in different areas especially in health where the climate changes cause many diseases. Furthermore, our topics for discussion include floods that affect agriculture. In this case, we have had discussion about the problem of floods in attempt to find out possible solutions to mitigate this problem.

[Interviewee 2]: Throughout the course, we have assessed our students on discussion and solutions of environmental problems during fieldwork activities. In these activities, we supervise students' fieldwork and we do qualitative assessment on the fieldwork activities such as interviews. However, we have taken our students to the field in order to live the real situation of physical planning such as community ordering and this leads us to discuss how people have been resettled in the community and analyse whether there is physical planning or not.

Table 21: The variable research-oriented and the discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in the CELC of the Faculty of Engineering-UEM

Variable 3: Research-oriented
[Interviewee 1]: We have created scenarios about real life problems in the discipline for students to discuss. In this context, in all lectures that we give, we fit the scenarios to the reality of our cities, country and other countries. For instance, we question about works of engineering that are reported in the media at national and international level. In this case, we try to integrate theoretical problems from literature with practice. Sometimes, we analyse and discuss problems and real culture of engineering in order to hear the views of students associated with their level of knowledge acquired as well as the solutions or alternatives that students can give to certain

problems that happen in daily life.

[Interviewee 3]: During the discussion in the classroom, we raise open questions and we let some volunteers to answer the questions or we indicate one student to answer the question. I usually give scenarios such as let us suppose that a bridge under a river was damage during the floods so what you should do to avoid the collapse of the bridge. In this case, I ask students to give their opinions individually and at the end I summarise all contributions from students and I analyse what it is near the feasible solution. Then I can speak of various aspects of the problem solution practicability. However, we sometimes raise a question for student to discuss in self-study and they present their work in the following lecture for discussion.

[Interviewee 2]: The assessment of students on a problem solution is more concerned with qualitative analysis. For example, I can challenge students with an activity which consists of construction of a bridge in a reduced scale using spaghetti as a project of the discipline. In this case, this kind of project aims to stimulate students' creativity and bring new functional solutions in which there is establishment of a set of rules and formulas as well as regulations related to weight, resistance and aesthetics of the bridge.

4.4.3 Data presentation of the variable research-oriented from the documentary analysis of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section presents the data of the variable research-oriented obtained through the documentary analysis of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM and the data are displayed in table 22 and table 23 (see page 109 and 110 respectively).

Table 22 (on page 109) and table 23 (on page 110) indicate the curriculum discourses concerning with the variable research-oriented from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. As can be seen in tables 22 and 23, the curriculum discourses of the EELC and CELC showed differences in the way of teaching, learning and assessing. The data in table 22

suggested that the teaching-learning methods in the EELC were centred on the student for problem solving in the professional area. Consequently, knowledge was regarded as a tool for carrying out professional activities and these activities involved problem solving and simulation. In turn, these activities had assessment and the purpose of the assessment was to measure students' skills in solving problems in the environmental area. By contrast, the data in table 23 implied that the teaching-learning methods in the CELC were centred on the lecturer as they involved lectures in the discipline to develop students' abilities for professional skills in the discipline. Besides, the teaching methods in the CELC included the development of projects in the discipline in order to consolidate the knowledge of the discipline. Furthermore, assessment consisted of development and presentation of projects in the discipline.

Although there were differences in teaching-learning activities between the EELC and CELC, similarity existed. As can be seen from the data in table 22 and table 23, students in the EELC and CELC did internship activities in the discipline in order to integrate theory and practice and develop 'know how' skills in the professional area of training through the contact with socio-professional reality and experienced professionals who transmitted practical relevant experience. At the same time, the internship activities helped students develop ethics in the professional area of training.

Table 22: The variable research-oriented and the curriculum discourse of the EELC of the Faculty of Education-UEM

	Variable 3: Research-oriented
Teaching-learning methods	Teaching-learning methods were centred on the individual as a flexible professional that was supposed to provide answers to situations and new problems so the individual was expected to master research methods techniques used for social and professional investigation. In this way, knowledge was regarded as a tool for carrying out professional activities.

Teaching-learning activities	Teaching learning activities included problem solving, simulation, production of environmental visual aids to support environmental training, internships and reports at the end of the course. In this context, internships aimed to develop know how skills and ethics in the professional area of training and transition phase from student life to professional life and acquiring of professional abilities. At the same time, the internships helped integrate theory and practice in the professional area through the contact with socio-professional reality and experienced professionals who transmitted practical relevant experience. Meanwhile, training in environmental education was expected to develop students' interaction and understanding of the Mozambican reality for a proactive action and change.
Assessment	The assessment was done to measure skills in environmental problem solving through education. For example, the design of environmental education materials and integration and operationalisation of environmental contents in school curricula

Table 23: The variable research-oriented and the curriculum discourse of the CELC of the Faculty of Engineering-UEM

	Variable 3: Research-oriented
Teaching-learning methods	Teaching-learning methods involve lectures in the discipline aimed to develop students' abilities and attitudes for professional skills in the civil engineering field. In this context, the disciplines of specialisation introduce knowledge directed to application. At the same time, the teaching-learning methods included the development of projects in the discipline as well as internships for specialisation.
Teaching-learning activities	Teaching-learning activities comprised teaching of course disciplines and development of disciplinary projects as well as internships.
Assessment	Assessment of research projects in the discipline.

4.4.4 Data presentation of the variable research-oriented from questionnaires conducted to students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section provides the data of the variable research-oriented obtained through questionnaires conducted to year four students in the EELC of the Faculty of Education and CELC of the Faculty of Engineering at UEM related to students' feelings, perceptions or practices regarding to how the students learn to construct knowledge in the discipline in order to integrate teaching and research in the courses stated before. The data are displayed in table 24 (see page 112).

Table 24 (on page 112) provides the percentages of students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM concerning with knowledge construction in the discipline. As can be seen in table 24 (on page 112), 65.2% of students in the EELC and 73.9% of students in the CELC learnt how to construct knowledge in the discipline through scenarios or situations of real life problems in the area of the study. Furthermore, the data in table 24 indicated that 60.4% of students in the EELC and 60.8% of students in the CELC were assessed on solving problems in the area of the study during or at the end of a semester.

Table 24: The variable research-oriented from the questionnaires conducted to students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

Knowledge construction in the discipline (N=23)

	EELC of the Faculty of Education					**CELC of the Faculty of Engineering**				
	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)
X23	7 (30.4)	8 (34.8)	1 (4.3)	2 (8.7)	5 (21.7)	5 (21.7)	12 (52.2)	3 (13.0)	2 (8.7)	1 (4.3)
X24	1 (4.3)	2 (8.7)	5 (21.7)	5 (21.7)	10 (43.5)	4 (17.4)	8 (34.5)	6 (26.1)	3 (13.0)	2 (8.7)
X25	3 (13.0)	7 (30.4)	6 (26.1)	4 (17.4)	3 (13.0)	5 (21.7)	9 (39.1)	2 (8.7)	5 (21.7)	2 (8.7)
X26	1 (4.3)	5 (21.7)	3 (13.0)	5 (21.7)	9 (39.1)	3 (13.0)	7 (30.4)	5 (21.7)	4 (17.4)	4 (17.4)

SA = Strongly agree; A = Agree; NAND = Neither agree Nor disagree; D = Disagree; SD = Strongly disagree

N = Number of respondents in each course; f = frequency; % = percentage

X23 - Your lecturers provide scenarios or situations of real life problems in your area of study for students to discuss and find possible solutions or decisions.

X24 - Your lecturers formulate their own questions or hypotheses for students to do research.

X25 - You are assessed on solving problems in the area of the study during or at the end of a semester.

X26 - During or at the end of a semester you are assessed on answering questions or hypotheses framed by your lecturers.

4.4.5 Data presentation of the variable research-oriented from questionnaires conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section is related to the data of the variable research-oriented gathered from questionnaires conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM concerning with lecturers' feelings, perceptions or practices in relation to activities that the lecturers use to help students learn how to construct knowledge in the discipline in order to integrate teaching and research in the courses stated earlier. The data are displayed in table 25 (see page 114).

As can be seen in table 25 (on page 114), the data showed differences in the way lecturers in the EELC and CELC involved their students in learning how to construct knowledge in the discipline through scenarios or situations of real life problems. The data in table 25 indicated that lecturers in the EELC engaged their students in knowledge construction in the discipline through scenarios or situations of real life problems less than lecturers in the CELC did. For instance, 42.9% of lecturers in the EELC engaged their students in learning how to construct knowledge in the discipline through scenarios or situations of real life problems in comparison to 71.4% of lecturers in the CELC. However, the data in table 25 suggested that 71.5% of lecturers in the EELC assessed their students on problem solving in the area of the study more than 57.2% of lecturers in the CELC did. Furthermore, the data in table 25 indicated that 42.9% of lecturers in the EELC and 71.5% of lecturers in the CELC formulated questions or hypotheses for their students to do research, that is, lecturers in the EELC formulated questions or hypotheses for their students to do research less than lecturers in the CELC did. Likewise, the data in table 25 revealed that 85.8% of lecturers in the CELC framed their own research questions or hypotheses for their students to do research as an assessment activity more than 42.9% of lecturers in the EELC did.

Table 25: The variable research-oriented from the questionnaires conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

Knowledge Construction in the discipline (n=7)

	EELC of the Faculty of Education					**CELC of the Faculty of Engineering**				
	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)
X20	3 (42.9)		1 (14.3)	1 (14.3)	2 (28.6)	1 (14.3)	4 (57.1)	1 (14.3)	1 (14.3)	
X21	1 (14.3)	2 (28.6)	1 (14.3)	2 (28.6)	1 (14.3)	2 (28.6)	3 (42.9)	1 (14.3)	1 (14.3)	
X22	2 (28.6)	3 (42.9)	1 (14.3)		1 (14.6)	1 (14.3)	3 (42.9)	3 (42.9)		
X23	2 (28.6)	1 (14.3)	1 (14.3)		3 (42.9)		3 (42.9)	3 (42.9)	1 (14.3)	

SA = Strongly agree; A = Agree; NAND = Neither agree Nor disagree; D = Disagree; SD = Strongly disagree

N = Number of respondents in each course; f = frequency; % = percentage

X20 - Your students provide scenarios or situations of real life problems in the area of the study for students to discuss and find possible solutions or decisions.

X21 - You formulate questions or hypotheses for your students to do research.

X22 - You assess your students on solving problems in the area of the study during or at the end of the semester.

X23 - You frame research questions or hypotheses for your students to do research as an assessment activity.

4.4.6 Summary of the data from the variable research-oriented in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

On the whole, students in the EELC of the Faculty of Education and students in the CELC of the Faculty of Engineering at UEM learnt how to construct knowledge in the discipline through scenarios or situations of real life problems in their areas of the study. In comparison, lecturers in the EELC had taken students to the field in order to live the real situation concerning with the environmental issues such as physical planning which included community ordering in attempt to integrate theoretical problems from literature with practice. Furthermore, lecturers in the EELC had assessed their students on discussion and solutions of environmental problems and the purpose of the assessment was to measure students' skills to solve problems in the environmental area. Similarly, lecturers in the CELC had created scenarios or situations for students to discuss problems and real culture in the area of the study as a way of understanding the views of students associated with their level of knowledge acquired in the discipline as well as the solutions or alternatives given to certain problems that happen in daily life. Moreover, students in the CELC are assessed on problem solving in the discipline in order to measure students' creativity and functional solutions in the framework of rules and formulas. Meanwhile, in both EELC and CELC, students did internship activities in their disciplines in order to integrate theory and practice and develop 'know how skills' in their professional areas of the study through contact with socio-professional reality and experienced professionals who transmitted practical experience. In contrast, the teaching-learning methods in the EELC were centred on the student for problem solving in the professional area, thus, knowledge was regarded as a tool for carrying out professional activities. Whereas, the teaching methods in the CELC were centred on the lecturer since they involved lectures in order to develop students' professional skills.

4.5 Data presentation of the variable research-led

This section is concerned with the data presentation of the variable research-led. The section presents, compares and contrasts the data obtained through four research methods specifically semi-structured qualitative interview, qualitative documentary

analysis, observation and quantitative questionnaire conducted to year 4 undergraduate students and their lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. The section is subdivided into four sub-sections. The first sub-section presents the data of the variable research-led from the semi-structured qualitative interview. The second sub-section is related to the data presentation of the variable research-led from the qualitative documentary analysis. The third sub-section is concerned with the data presentation of the variable research-led from the quantitative observation and the fourth sub-section is about the data presentation of the variable research-led from the quantitative questionnaire.

4.5.1 Data presentation of the variable research-led from the semi-structured qualitative interview with students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section presents the data of the variable research-led gathered from the semi-structured qualitative interview with year 4 undergraduate students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM regarding to learning about others' research in order to integrate teaching and research in the courses stated before. The data are presented in table 26 and table 27 (see page 118 and 119 respectively).

Tables 26 and 27 (on pages 118 and 119 respectively) provide the data obtained through the semi-structured qualitative interview with year 4 undergraduate students about the variable research-led in the EELC of the faculty of Education and the CELC of the faculty of Engineering at UEM. As can be seen from table 26 and table 27, there were differences in the way that students used research studies already produced to learn how to do research.

In table 26 (see page 118), [Interviewee 4] revealed that students were more concerned with literature, different approaches from the authors about an issue and conclusion that they had reached about their work…students analysed the research methods and they focused more on the organisation of the assignment and central idea of the topic. Students analysed research instruments in the discipline of Environmental Impacts in year 4 even though it was not frequent. In addition,

students analysed the strengths and weaknesses of the legislation about the evaluation of environmental impacts. In this context, the lecturer gave students an article to read and identify its strengths and weaknesses or the lecturer provided the general idea of what students should extract from the article. Nevertheless, students focused more on the content, that is, the main ideas of the article and conclusion of the author.

In table 26 (see page 118), [Interviewee 2] commented that:

> *My feeling about the lecturers who use dissertations or theses already produced as a model for students to conduct research is that lecturers should give us a direction how to do research and I think this sometimes helps because you cannot reach an unknown place easily if you do not have a map for orientation. However, I do not know whether it is laziness or students like easy things because they use the model to do copy paste (reproduce) the information for their assignments while they should look for the procedures from the model provided to see how the research is done, how to analyse data and what is the direction to follow in research. In spite of some students using copy paste of information provided as a model to do research, other students benefit from the model to do their research.*

In table 27 (see page 119), [Interviewee 5] admitted that students had a guidance which determined how they should do essays, but they never investigated about the guidance so they exactly followed those recommendations when they used regulations, especially in dimensioning of roads and bridges….Therefore, each author did his/her recommendations according to his or her experience, but the most important for students was regulation that they should respect because in case of a problem in a construction work, the instrument that can be used is a construction regulation.

In table 27 (see page 119), [Interviewee 2] noted that:

> *We have some well-informed lecturers who bring to the class issues that occur in the world associated with civil engineering and they have commented about current research related to some aspects of*

engineering although it is not a deep comment. In addition, some lecturers present slides or videos about research that has already done. Furthermore, the lecturers give us attention about problems of engineering in society as a way of integrating students in the professional life.

In table 27 (see page 119), [Interviewee 1] asserted that "the lecturers in my course are more concerned with giving information, for example, they raise or explain issues that we should know and pay attention to them. However, we have commented that we are more theoretical professionals since we do not have much practice."

In table 27 (see page 119) [Interviewee 4] revealed that students did written tests or laboratory tests and examinations during and at the end of the semester respectively…. Students had done oral assessment…. Nonetheless, an important issue that he had understood throughout the four years of his course was that laboratory assignments or essays were the most relevant for consolidation of the knowledge taught in lectures.

Table 26: The variable research-led and the discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the EELC of the Faculty of Education-UEM

Variable 4: research-led
[Interviewee 4]: We are more concerned with literature, different approaches from the authors about an issue and conclusion that they have reached in their work. At the same time, we analyse the research methods and we focus more on the organisation of the assignment and central idea of the topic. We have analysed research instruments in the discipline of Environmental Impacts in year 4 even though it is not frequent. In addition, we analyse the strengths and weaknesses of the legislation about the evaluation of environmental impacts. In this context, the lecturer gives us an article to read and identify its strengths and weaknesses or the lecturer gives the general idea of what student should extract from the article. Nevertheless, we focus more on the content, that is, the main ideas of the article and conclusion of the author. [Interviewee 2]: My feeling about the lecturers who use dissertations or theses already

produced as a model for students to conduct research is that lecturers should give us a direction how to do research and I think this sometimes helps because you cannot reach an unknown place easily if you do not have a map for orientation. However, I do not know whether it is laziness or students like easy things because they use the model to do copy paste (reproduce) the information for their assignments while they should look for the procedures from the model provided to see how the research is done, how the data is analysed and what is the direction to follow in research. In spite of some students using copy paste of information provided as a model to do research, other students benefit from the model to do their research.

Table 27: The variable research-led and the discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the CELC of the Faculty of Engineering-UEM

Variable 4: Research-led
[Interviewee 5]: We have a guidance which determines how we should do essays, but we never investigate about the guidance so we exactly follow those recommendations when we use regulations, especially in analysis and designs of roads and bridges. Even though some people say that engineering science is accurate, it is no as accurate as we think. Therefore, each author does his/her recommendations according to his or her experience, but the most important for us are regulations that we should respect because in case of a problem in a construction work, the instrument that we can use to solve the problem is a construction regulation. [Interviewee 2]: We have some well-informed lecturers who bring to the class issues that occur in the world associated with civil engineering and they have commented about current research related to some aspects of engineering although it is not a deep comment. In addition, some lecturers present slides or videos about research that has already been done. Furthermore, the lecturers give us attention about problems of engineering in society as a way of integrating students in the professional life. [Interviewee 1]: The lecturers in my course are more concerned with giving students information, For example, they raise or explain issues that we should know and pay attention to them. However, we have commented that we are more theoretical

professional since we do not have much practice.

[Interviewee 1]: We do written tests or laboratory tests and examinations during and at the end of the semester respectively. Besides written assessments, we have oral assessment. In addition, we have had calculation assignments as well as analysis and design as assessment activities. Nonetheless, an important issue that I have understood throughout the four years of my course is that laboratory assignments or essays are the most relevant for consolidation of the knowledge taught in lectures.

4.5.2 Data presentation of the variable research-led from the semi-structured qualitative interview with lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section is concerned with the data presentation of the variable research-led obtained through semi-structured qualitative interviews conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM related to learning about others' research in order to integrate teaching and research in the courses stated before. The data are presented in tables 28 and 29 (see pages 123 and 124 respectively).

Table 28 (on page 123) and table 29 (on page 124) provide the data of the variable research-led gathered from the semi-structured qualitative interview with lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. As can be seen in tables 28 and 29, the data showed similarities and differences between the EELC and CELC regarding to what lecturers did to involve their students in learning about others' research.

In table 28 (see page 123), [Interviewee 1] reported that:

> *I have presented current research in the discipline as a model for student to learn how to do research since it is one of the ways to show how students can do research and stimulate students' research. This way can help students be aware of formulation of research aims…..current research in the discipline can motivate students to do research projects such monographs instead of internships…the current*

> *research in the discipline can make students be aware of the world knowledge evolution since it gives analysis or real problems. Furthermore, recent research can be a model for students to see how things are done, for example how to deal with a research topic, literature review or data discussion.*

In table 28 (see page 123), [Interviewee 2] commented that in spite of giving students a model from the research already conducted to learn how to do research, it was important to give students a model from the work done by their fellow students. In this way, the student could feel that if my fellow student was able to do the work, I might do it as well. As a result, this could motivate students do to their own research since they have a starting point.

In table 28 (see page 123), [Interviewee 3] noted that:

> *Students conduct research and bring much information, but they do not criticise the information. This means that students do research, yet it lacks quality because of poor critical view of students in their research which is linked to the lack of bibliography as our library has more literature written in English than in Portuguese which is the official language. However, students do not master English, as a consequence they use Google Translate without critical analysis and discussion of information, that is, they do copy and paste of the information from internet to compose their essays.*

In table 28 (see page 123), [Interviewee 2] asserted that lecturers had given students some written tests, examinations as well as oral presentations as assessment activities throughout the course.

Moreover, in table 29 (see page 124), [Interviewee 3] thought that it was a good idea to use the research already done as models for students to do research as students in general did not like to do research. Therefore, students had difficulties in doing their assignments so the lecturer should provide students input and some of the input could be a model of the research already produced for students to see how to conduct a

research project.

In table 29 (see page 124), [Interview 3] explained that:

> *In the discipline with a project, I have provided models of projects concerning with real structures such as a sample of a real project. For instance, I have provided students a sample of a real project of the Maputo Catembe Bridge. I would like to emphasise that the project of the discipline is an academic project in which the time available for its development is four months, but this time is not enough to produce similar contents to a real project. In this case, the sample of the real projects may be used as a reference or an idea how to do the project of the discipline or future projects in the professional life.*

In table 29 (see page 124), [Interviewee 2] commented that in spite of the curriculum [of civil engineering] having conditions for research, it was not enough because at the beginning of the course, the learning skills were not covered. As a consequence, students did not know how to study. In this context, [Interviewee 2] suggested that there should be some methods of teaching that could help students organise their academic life in order to achieve the goals in an appropriate way. However, [Interviewee 1] in table 29 believed that the curriculum of civil engineering was squeezed, as a result, students were only committed to the curriculum subjects available and running in a semester. At the same time, students had many curriculum subjects to attend including those which they failed as well as academic projects and these projects were large and they were undertaken in groups. Consequently, students did not have time to conduct research. Finally, [Interviewee 2] in table 29 reported that students had written tests and examinations with theoretical and practical components.

Table 28: The variable research-led and the discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in the EELC of the Faculty of Education-UEM

Variable 4: Research-led
[Interviewee 1]: I have presented current research in the discipline as a model for student to learn how to do research since it is one of the ways to show how students can do research and stimulate students' research. This way can help students be aware of formulation of research aims. On the one hand, current research in the discipline can motivate students to do research projects such monographs instead of internships, on the other hand the current research in the discipline can make students be aware of the world knowledge evolution since it gives analysis or real problems. In this case, current research [in the discipline] aims to show how things are done such as how to deal with a research topic, literature reviews or data discussion. [Interviewee 1]: We have given our students some written tests, examinations and oral presentations as assessment activities throughout the course. [Interviewee 2]: In spite of giving students a model from the research already conducted to learn how to do research, it is important to give students a model from the work done by their fellow students. In this way, the student can feel that if my fellow student was able to do the work, I can do it as well. This can motivate students to do their own research since they have a starting point. [Interviewee 3]: Students conduct research and bring much information, but they do not criticise the information. This means that students do research, yet it lacks quality as a result of poor critical view of students in their research which is linked to the lack of bibliography as our library has more literature written in English than in Portuguese which is the official language. However, students do not master English, as a consequence they use Google Translate without critical analysis and discussion of information, that is, they do copy and paste to compose their works.

Table 29: The variable research-led and the discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in the CELC of the Faculty of Engineering-UEM

Variable 4: Research-led
[Interviewee 3]: I think that it is a good idea to use the research already done as models for students to do research as students in general do not like to do research perhaps it is because we study in order to be assessed. For instance, students study near the date of a test or exam and after that they keep the books and they progress in this way. Consequently, students have difficult when we raise issues from the previous year so this reveals that they do not do long life learning. Moreover, students have difficulties in doing their assignments so the lecturer should provide students input and some of the input can be a model of the research already produced for students to see how things are done in a research project. [Interviewee 3]: In the discipline with a project, I have provided models of projects concerning with real structures such as a sample of a real project. For instance, I have provided students a sample of a real project of the Bridge Maputo, Catembe. I would like to emphasise that the project of the discipline is an academic project in which the time available for its development is four months, but this time is not enough to produce similar contents to a real project. In this case, the sample of the real projects may be used as a reference or an idea how to do the project of the discipline or future projects in the professional life. [Interviewee 2]: In spite of the curriculum having conditions for research, I think that it is not enough because at the beginning of the course, the learning skills are not covered, as a consequence students do not know how to study. In this context, I think that there should be some methods of teaching that can help students organise their academic life in order to achieve the goals in an appropriate way. [Interviewee 1]: The curriculum of civil engineering is squeezed, as a result students are only committed to the curriculum subjects available and running in a semester. At the same time, students have many curriculum subjects to attend including those

which they have failed as well as academic projects and these projects are large and they are undertaken in groups. Consequently, students do not have time to conduct research.

[Interviewee 2]: Students have written tests and examinations with theoretical and practical components.

4.5.3 Data presentation of the variable research-led from the documentary analysis of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section is concerned with the data of the variable research-led gathered from the documentary analysis of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering and the data are displayed in tables 30 and 31 (see page 126).

Tables 30 and 31 (on page 126) provide the curriculum discourses of the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM respectively relating to the variable research-led. As can be seen from the data in tables 30 and 31, the curriculum discourses of the EELC and CELC showed similarities between the two courses regarding to learning about research studies produced by others as a way of integrating teaching and research in higher education. In addition, the data from tables 30 and 31 indicated that there were similarities in teaching-learning methods, learning activities and types of assessment. As revealed in table 30 and table 31, the teaching-learning methods of the EELC and CELC were centred on the lecturer and the role of the lecturer was to give students information. Likewise, in both courses, the teaching-learning activities were based on lectures and the types of assessment consisted of tests and exams.

Table 30: The variable research-led and the curriculum discourse of the EELC of the Faculty of Education-UEM

	Variable 4: Research-led
Teaching-learning methods	Teaching-learning methods were centred on the lecturer and the role of the lecturer was to provide students information.
Teaching-learning activities	Teaching-learning activities involve expositive lectures in a direct contact with the lecturer.
Assessment	The assessment consisted of written tests and exams, quantitative assessment, portfolio observation. In this case, the assessment aimed to provide information to students about the teaching-learning process so the assessment had a didactic function for measuring students' knowledge acquired in a unit or topic that had been taught. At the same time, the assessment aimed to measure students' skills at knowledge taught.

Table 31: The variable research-led and the curriculum discourse of the CELC of the Faculty of Engineering-UEM

	Variable 4: Research-led
Teaching-learning methods	Teaching-learning methods were centred on the lecturer in which the role of the lecturer was to give students lectures and information.
Teaching-learning activities	The process of teaching and learning involved theoretical, practical and laboratory lectures.
Assessment	The assessment consisted of tests and exams.

4.5.4 Observation of streams in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section shows the results of the variable research-led obtained through the quantitative observation of streams of year 4 licenciatura students in the EELC of the

Faculty of Education and the CELC of the Faculty of Engineering at UEM. The data are displayed in tables 32 and 33 (see pages 128 and 130 respectively).

As shown in table 32 (on page 128) and table 33 (on page 130), 12 items regarding to teaching practices in order to integrate teaching and research were observed during 14 different lectures in year 4 streams from the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. As can be seen in table 32 and table 33, the EELC and CELC showed a similarity in their teaching practices. As revealed in tables 32 and 33, students listened to their lecturers' presentations and took notes during lectures in both EELC and CELC. In spite of a similarity between the EELC and CELC concerning with their teaching practices, differences existed. The data in tables 32 and 33 demonstrated that there was more interaction between students in groups for presentation of assignments in the EELC rather than CELC. Likewise, tables 32 and 33 indicated that students in the EELC discussed knowledge or ideas loosely guided by the lecturer in comparison to students in the CELC.

Table 32: Observation of a stream in the EELC of the Faculty of Education-UEM

L1	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	III					
X4						NA
X5	II					
X6						NA
X7					I	
X8						NA
X9						NA
X10						NA
X11						NA
X12						NA

L2	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4			I	I		
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10						NA
X11						NA
X12	I				I	

L3	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	I		I			
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIII					
X11						NA
X12						NA

L4	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	II		I			
X4						NA
X5				I		
X6						NA
X7	I				I	
X8						NA
X9	IIII					
X10						NA
X11						NA
X12						NA

L5	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	II				I	
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	III					
X11						NA
X12						NA

L6	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIII	II				
X11						NA
X12						NA

L7	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIII					
X11						NA
X12						NA

L8	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIIII					
X11						NA
X12						NA

L9	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	I					
X4						NA
X5	II					
X6						NA
X7						NA
X8						NA
X9						NA
X10						NA
X11						NA
X12						NA

L10	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4					II	
X5					I	
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIII	I				
X11						NA
X12	I	I				

L11	VG	G	F	P	VP	NA
X1			II	I		
X2						
X3			II			NA
X4						NA
X5	I			I		
X6						NA
X7						NA
X8			I			
X9						NA
X10	II		III			
X11						NA
X12			I			

L12	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	III			II		
X11						NA
X12						NA

L13	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIII					
X11						NA
X12						NA

L14	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6	III			I		
X7						NA
X8						NA
X9	I					
X10			II			
X11	II					
X12			II			

L- Lecture

VG – Very good, G – Good, F – Fair, P – Poor, VP – Very poor, NA – Not applicable

X1 - Interaction between students in groups to discuss knowledge or ideas

X2 - Interaction between students in pairs to discuss knowledge or ideas

X3 - Interaction between students in groups for presentation of assignments

X4 - Interaction between students in pairs for presentation of assignments

X5 - Students discuss knowledge or ideas loosely guided by the lecturer

X6 - Students give feedback

X7 - The lecturer provides feedback when is needed

X8 – Students work individually to answer questions or explain hypotheses framed by the lecturer

X9 – Students work individually to solve problems posed by the lecturer in the discipline

X10 - Students listen to the lecturer's presentations and take notes

X11 - Students do reading individually

X12 - Feedback given by the lecturer

Table 33: Observation of a stream in the CELC of the Faculty of Engineering-UEM

L1	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9	II	II	I	IIII		
X10	III					
X11						NA
X12	I	I				

L2	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8		I		II		
X9		II				
X10		I				
X11						NA
X12						NA

L3	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8	IIII	I				
X9						NA
X10	II	I		III		
X11						NA
X12						NA

L4	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9			I			
X10	IIIII	I				
X11						NA
X12						NA

L5	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIIII					
X11						NA
X12						NA

L6	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10		IIIII	I		I	
X11						NA
X12						NA

L7	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9			IIIII		II	
X10	IIII	I				
X11						NA
X12						NA

L8	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9	I	I				
X10	III			I		
X11						NA
X12	II					

L9	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIII	I				
X11						NA
X12						NA

L10	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4					II	
X5					I	
X6						NA
X7						NA
X8						NA
X9						NA
X10		IIIII				
X11						NA
X12	I	I				

L11	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9			I	III		
X10						NA
X11	IIII	III				
X12						NA

L12	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIII					
X11						NA
X12						NA

L13	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIIII					
X11						NA
X12						NA

L14	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	III		I	I		
X4						NA
X5	I		I			
X6						NA
X7			I			
X8						NA
X9						NA
X10						NA
X11						NA
X12	III					

L- Lecture

VG – Very good, G – Good, F – Fair, P – Poor, VP – Very poor, NA – Not applicable

X1 - Interaction between students in groups to discuss knowledge or ideas

X2 - Interaction between students in pairs to discuss knowledge or ideas

X3 - Interaction between students in groups for presentation of assignments

X4 - Interaction between students in pairs for presentation of assignments

X5 - Students discuss knowledge or ideas loosely guided by the lecturer

X6 - Students give feedback

X7 - The lecturer provides feedback when is needed

X8 – Students work individually to answer questions or explain hypotheses framed by the lecturer

X9 – Students work individually to solve problems posed by the lecturer in the discipline

X10 - Students listen to the lecturer's presentations and take notes

X11 - Students do reading individually

X12 - Feedback given by the lecturer

4.5.5 Data presentation of the variable research-led from the questionnaire conducted to students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section provides the data of the variable research-led gathered from questionnaires conducted to year four students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM related to students' feelings, perceptions or practices in connection to how students learn about others' research in order to integrate teaching and research in the courses already stated. The data are displayed in table 34 (see page 133).

Table 34 (on page 133) displays the percentage of students in the EELC of the Faculty of Education and the percentage of students in the CELC of the Faculty of Engineering at UEM regarding to the use of research studies produced by others as a way of learning how to integrate teaching and research in higher education. Table 34 revealed that 73.9% of students in the EELC and 65.2% of students in the CELC used dissertations or theses that had been produced as models for learning how to do

research. In addition, the data from table 34 demonstrated that 100% of students in the EELC and 95.7% of students in the CELC wrote tests or examinations during or at the end of a semester or a year. Besides, the data in table 34 indicated that 91.3% of students in the EELC and 95.7% of students in the CELC wrote or presented assignments at the end of a course or module.

Although there were similarities between the EELC and CELC concerning with learning about research studies produced by others, differences existed. As shown by the data in table 34 (see page 133), 52.2% of students in the EELC analysed methodologies or research findings of the studies already conducted in the discipline while 34.7% of students in the CELC did not analyse methodologies or research findings of the studies already conducted in the discipline. Furthermore, the data in table 34 revealed that 87% of students in the EELC did not do laboratory activities whereas 95.6% of students in the CELC did laboratory activities.

Table 34: The variable research-led from the questionnaires conducted to students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

Learning about others' research (N=23)

	EELC of the Faculty of Education					**CELC of the Faculty of Engineering**				
	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)
X27	2 (8.7)	10 (43.5)	4 (17.4)	3 (13.0)	4 (17.4)	1 (4.3)	7 (30.4)	7 (30.4)	5 (21.7)	3 (13.0)
X28	3 (13.0)	14 (60.9)	2 (8.7)	2 (8.7)	2 (8.7)	2 (8.7)	13 (56.5)	6 (26.1)	1 (4.3)	1 (4.3)
X29		2 (8.7)	8 (34.8)	6 (26.1)	7 (30.4)		5 (21.8)	6 (26.1)	8 (43.8)	4 (17.4)
X30			3 (13.0)	8 (34.8)	12 (52.2)	11 (47.8)	11 (47.8)			1 (4.3)
X31	19 (82.6)	4 (17.4)				18 (78.3)	4 (17.4)			1 (4.3)
X32	15 (65.2)	6 (26.1)	2 (8.7)			12 (52.2)	10 (43.5)		1 (4.3)	

SA = Strongly agree; A = Agree; NAND = Neither agree Nor disagree; D = Disagree; SD = Strongly disagree

N = Number of respondents in each course; f = frequency; % = percentage

X27 - You analyse methodologies or research findings of the study already conducted in the discipline.

X28 - You use dissertations or theses that have already been produced as models for doing research.

X29 - Your lecturers present current research in the discipline.

X30 - You do laboratory activities.

X31 - You do written tests or examinations during or at the end of a course.

X32 - You write or present assignments at the end of a course.

4.5.6 Data presentation of the variable research-led from the questionnaire conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section presents the data of the variable research-led gathered from questionnaires conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM related to the lecturers' feelings, perceptions or practices regarding to how lecturers involve their students in learning about others' research as a way of integrating teaching and research in the courses previously stated. The data are shown in table 35 (see page 135).

Table 35 (on page 135) gives the percentage of lecturers in the EELC of the Faculty of Education and the percentage of lecturers in the CELC of the Faculty of Engineering concerning with the use of others' research for students to learn how to do research. As shown by the data in table 35, there were similarities between the EELC and CELC in the way the lecturers in both courses involved their students in learning about others' research. Table 35 revealed that 57.2% of lecturers in the EELC and 84.7% of lecturers in the CELC used dissertations or theses that have been produced as models for their students to learn how to do research. Likewise, 71.5% of lecturers in the EELC and 85.7% of lecturers in the CELC presented current research in the discipline during lectures. Moreover, the data in table 35 demonstrated that 85% of lecturers in the EELC and 100% of lecturers in the CELC assessed their students on written tests or examinations during or at the end of a semester or year. At the same time, 85.8% of lecturers in the EELC and 100% of lecturers in the CELC assessed their students on writing or presenting assignments during or at the end of a course or module. In spite of having similarities between the EELC and CELC in the way of integrating teaching and research through the variable research-led, differences existed. The data in table 35 indicated that 57.1% of lecturers in the CELC did not engage their students in analysis of methodologies or research findings of the studies already conducted in the discipline while 42% of lecturers in the EELC were doubtful whether their students analysed methodologies or research findings of the studies already conducted in the discipline. In addition, 57.2% of lecturers in the CELC admitted that their students did laboratory activities whereas 42.9% of lecturers in the EELC were doubtful whether their students did laboratory activities.

Table 35: The variable research-led from the questionnaires conducted to lecturers in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

Learning about others' research (N=7)

	EELC of the Faculty of Education					**CELC of the Faculty of Engineering**				
	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)	SA (f/%)	A (f/%)	NAND (f/%)	D (f/%)	SD (f/%)
X24	1 (14.3)		3 (42.9)	1 (14.3)	2 (28.6)			3 (42.9)	4 (57.1)	
X25	2 (28.6)	2 (28.6)	3 (42.9)			1 (14.3)	5 (71.4)	1 (14.3)		
X26	2 (28.6)	3 (42.9)	2 (28.6)			5 (71.4)	1 (14.3)	1 (14.3)		
X27	1 (14.3)	1 (14.3)	3 (42.9)	1 (14.3)	1 (14.3)	1 (14.3)	3 (42.9)	2 (28.6)	1 (14.3)	
X28	4 (57.1)	2 (28.6)	1 (14.3)			7 (100)				
X29	3 (42.9)	3 (42.9)	1 (14.3)			6 (85.7)	1 (14.3)			

SA = Strongly agree; A = Agree; NAND = Neither agree Nor disagree; D = Disagree; SD = Strongly disagree

N = Number of respondents in each course; f = frequency; % = percentage

X24 - Your students analyse methodologies or research findings of the studies already conducted in the discipline.

X25 - You use dissertations or theses that have already been produced as models for doing research.

X26 - You present current research in the discipline during lectures.

X27 - Your students do laboratory activities.

X28 - You assess your students on written tests or examinations during or at the end of a semester or year.

X29 - You assess your students on writing or presenting assignments at the end of a course or module.

4.5.7 Summary of the data of the variable research-led in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

Overall, the data of the variable research-led indicated that students in the EELC of the Faculty of Education and students in the CELC of the Faculty of Engineering at UEM used others' research studies such as dissertations or theses as models for learning how to do research. However, there were differences between the EELC and CELC in the way students employed others' research studies to learn how to do their own research. In the EELC, lecturers had provided their students current research in the discipline as models for the students to learn how to do research. Nonetheless, students used the models to do copy and paste, that is, to reproduce the information for their assignments instead of a critical look at the process of doing research. In this case, the lecturers in the EELC claimed that a poor critical view of their students may be linked to more literature written in English rather than in Portuguese which is the official language used in the research setting. Nevertheless, students do not master English, as a consequence, they used Google Translate for translation of information from internet to compose their assignments without critical analysis and discussion of the information.

Whereas, lecturers in the CELC had provided students models of construction projects concerning with real structures so that students could use them as a reference or idea how to do a project of the discipline or future projects in the professional area. In addition, some lecturers in the CELC had presented slides or videos about current research in the discipline in the hope that students should be aware of problems of engineering in society and integrate them in the professional life. Besides, students in the CELC had a guidance which consisted of regulations and recommendations which determined how to do laboratory essays, or construction works, but they never enquired about the guidance. Despite the differences between the EELC and CELC in relation to the data of the variable research-led, similarities existed in their teaching practices. In both EELC and CELC, students predominantly listened to their lecturers' presentations and took notes during lectures. Likewise, students in both courses wrote tests or examinations during or at the end of a semester or year.

CHAPTER 5 DATA DISCUSSION

5.1 Introduction

Chapter 5 discusses the findings of the study in the context of the literature review concerning with the research-teaching nexus in higher education. The discussion of the findings of this study is divided into three sections. The first section provides the summary of the key findings of the study. The second section is related to the discussion of the research findings of the study. This section is subdivided into five sub-sections. The first and the second sub-section discuss the findings of the variables research-based and the research-tutored sequentially. The third and the fourth sub-section discuss the findings of the variable research-oriented and research-led respectively. The fifth sub-section discusses the findings obtained through teaching practices. Finally, the third section is concerned with the summary of the discussion of the research findings of the study.

5.2 Summary of the research findings

This section provides the summary of the research findings of the study regarding to the research-teaching nexus in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. As previously stated, the findings of this study emerged from the data obtained through four research methods specifically, a semi-structured qualitative interview, a qualitative documentary analysis, a quantitative classroom observation and a quantitative questionnaire in which four main variables relating to research questions emerged: research-based, research-tutored, research-oriented and research-led. These variables have implications for understanding how teaching and research are brought together in the EELC and CELC at UEM. Nevertheless, before discussing the findings, I present a summary of the results displayed by the four variables mentioned earlier in order to have a general idea concerning with their results. The results from the variables research-based, research-tutored, research-oriented and research-led indicate that similarities and differences exist between the EELC and CELC related to the integration of teaching and research in higher education.

The findings connected to the variable research-based show more similarities rather

than differences between the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. The findings obtained through questionnaires conducted to students reveal that 87% and 86.9% of students in the EELC as well as 86.6% and 74.2% of students in the CELC conduct individual and group research projects respectively. By contrast, the findings collected from interviews with students in the EELC and the CELC demonstrate that even though students in both courses conduct research, it is the poor quality due to the lack of critical view. This means that students undertake research projects, but they do not question the literature so they go directly to the objective without deeply discussing what is around the problem.

The findings related to the variable research-tutored indicate that exist similarities between the EELC of the Faculty of education and the CELC of the Faculty of Engineering at UEM in the way both courses integrate teaching and research. The finfings obtained through questionnaires conducted to students in the EELC and the CELC indicate that 85.2% of lecturers in the EELC and 85.8% of lecturers in the CELC assign topics to their students individually or in groups for writing essays under their tutorial. Meanwhile, 100% of students in the EELC and 95.6% of students in the CELC present academic essays in groups for discussions. However, the findings collected from questionnaires with the lecturers in the EELC and CELC reveal that students in the EELC and CELC lack abilities to question or criticise the literature and adapt it to the reality. For examples, lecturers in the EELC claim that students mainly from year 1, year, 2 and year 3, transcribe information specifically from internet. In addition, students do not discuss the concepts with more than two or three authors who could help students develop a variety of ideas and critical thinking.

The findings linked to the variable research-oriented show that exist similarities and differences between the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM in the way both courses integrate teaching and research. The findings obtained through questionnaires conducted to students in the EELC and the CELC show that 65.2% of students in the EELC and 73.9% of students in the CELC learn how to construct knowledge in the discipline through scenarios or situations of real life problems in the area of the study. Despite similarities between

the EELC and CELC, differences exist. The findings obtained through documentary analysis in the EELC reveal that the teaching-learning methods of the EELC are centred on the student for problem solving in the professional area, consequently, knowledge is regarded as a tool for carrying out professional activities and these activities involve problem solving and simulation. By contrast, the findings obtained through documentary analysis in the CELC indicate that the teaching-learning methods of CELC are centred on the lecturer as they involve lectures in the discipline. Conversely, the teaching-learning methods in the CELC are centred on the student since students undertake disciplinary projects which aim to develop their abilities for professional skills in the discipline.

The findings related to the variable research-led indicate that similarities exist between the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM in the way both courses integrate teaching and research. The findings collected from interviews with lecturers in EELC and CELC demonstrate that lecturers in both courses give students research studies that have been produced as models for students to see how to do research, for example, how to deal with a research topic, literature review or data discussion. For instance, the findings obtained through questionnaires conducted to students in the EELC and the CELC indicate that 73.9% of students in the EELC and 65.2% of students in the CELC use dissertations or theses that have been produced as models for learning how to do research. Meanwhile, the findings obtained through classroom observations in EELC and CELC reveal that in both courses students predominantly listen to their lecturers' presentation and take notes during lectures. Furthermore, the findings collected from the documentary analysis in the EELC and CELC demonstrated the teaching-learning methods in both courses are centred on the lecturer and the role of the lecturer is to give students information. Likewise, the types of assessment consist of tests and exams.

5.3 Discussion of the research findings

This section presents a discussion of the findings of this research. As previously stated, the findings are discussed in the context of research questions of the study and literature review in attempt to understand the significance of the findings in relation

to integration of teaching and research in higher education. As mentioned earlier, the findings of this study consist of four main variables of the research-teaching nexus: research-based, research-tutored, research-oriented and research-led. Accordingly, the order of the discussion of the findings follows the same order as the findings of each variable were presented in the data presentation chapter.

5.3.1 The variable research-based curriculum and the integration of research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section discusses the research findings regarding to integration of research and teaching through the variable research-based in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

According to Brew (2006, p. 126), "… developing a research-based curriculum means opening up spaces and create places where students and academics can meet, areas where discussions can take place on research projects…". This means that students in research-based curriculum learn through research projects as Healey (2005) argues that research-based focuses mostly on enquiry-based activities [such as research projects] in which students are expected to learn as researchers. Meanwhile, the activities used for integration of research and teaching through the variable research-based in the EEL and CELC of the faculties and the institution aforementioned show similarities.

Comparing the results in table 6 (see page 70) from the EELC of the Faculty of Education and table 7 (see page 70) from the CELC of the Faculty of Engineering at UEM, it can be seen that students in both courses conduct research projects throughout their courses. Table 8 (see page 73) shows that 87% and 86.9% of students in the EELC as well as 86.6% and 74.2% of students in the CELC conduct individual or group research projects respectively. In addition, [Interviewee 2] in table 3 (see page 61) says that "I have written and presented [individual and group] research projects at the level of the discipline for my class attendance…." Similarly, in table 2 (see page 60), [Interviewee 3] asserts that "I have conducted individual and group research projects during my course. For example, I have conducted research

projects in the discipline of Educational Research Methods…" In contrast, as can be seen in table 2 (see page 60), [Interviewee 4] states that "even though students have conducted research projects throughout their courses, it is the poor quality due to the lack of the critical view…. lecturers should give more priority to critical research because students read and reproduce knowledge." In table 3 (see page 61), [Interviewee 1] reveals that students have not specifically developed research projects, yet they have some assignments to consolidate the knowledge taught during lectures not necessarily research projects. For example, the lecturer teaches students how to calculate the structure of the construction work in the classroom. Then the lecturer gives students a project or a floor plan to design and after that, the students calculate the project or the construction cost. In table 5 (see page 67), [Interviewee 1] acknowledges that "...there is no condition at the level of engineering disciplines for doing research due to the lack of means…. Besides, students have low capacity for doing research…" Moreover, in table 4 (see page 66), [Interviewee 3] notes that "…I would be happy if all students of the EELC finished their course with monographs while some students do bibliography and others do an internship report, I cannot expresses my satisfaction with students' research."

Although students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM conduct research projects throughout their courses, the projects lack scholarship leading to surface learning. Boyer (1995) argues that scholarship includes four elements that are interlinked to one another: scholarship of discovery, scholarship of integration, scholarship of application and scholarship of teaching. In this case, the scholarship of discovery is concerned with the discovery [or construction] of knowledge and this scholarship points out that the most advanced enquiry leads to production of new ideas through critical thinking and reflection of the reality. Nevertheless, the scholarship of discovery is related to the scholarship of integration in the sense that after knowledge has been discovered it needs to be integrated into the area of the discovery and other broader areas. This means that one can have isolated pieces of knowledge from his/her discovery, but he/she can put them into a meaningful larger context through the scholarship of integration. In this way, the scholarship of discovery results in scholarship of integration. Furthermore,

knowledge obtained through scholarship of discovery and integration should be applied through scholarship of application in order to make knowledge relevant and give credit to people who discover [or construct] knowledge. Finally, the scholarship of teaching or transmission which aims to maintain the power of scholarship active and this can be done, for example, by using published academic work for teaching. Nonetheless, the four types of scholarship described earlier should be interconnected in a critical way.

Hughes (2005) sustains that scholarship facilitates the integration between teaching and research in higher education. At the same time, Barnett and Coate (2005) add that scholarship which consists of seeking knowledge through research can help to integrate teaching and research. Moreover, Elton (2005, p. 108) supports that "… scholarship can through learning build a bridge ('nexus') between research and teaching. However, this idea needs exploring in the light of different meanings that have been attached to the concept 'scholarship in general'…which is learning in research mode, that is,… questioning and exploring and never just a routine." This suggests that the lack of scholarship in research projects leads to reproduction of knowledge which includes surface approach to learning. According to Tight (2003), surface learning consists of acquiring knowledge structure without understanding it deeply. For Fry, Ketteridge and Mashall (2009), surface approach to learning occurs when students are not able to establish relationships between new information with the existing knowledge or adapt the new information to match with the existing knowledge and vice-verse. Surface approach to learning involves superficial levels of cognitive process leading to reproduction of knowledge in order to accomplish a course requirement task. In this view, students who employ surface approach to learning are concerned with acquisition of the body of knowledge rather than understanding it in a critical way.

Mumm and Kersting (1997, p. 3) asserts that theories are not facts, they must be evaluated for their value in specific practice settings … without critical thinking skills application of knowledge will prove difficult…" This assertion means that knowledge should not be taken for granted so it should be evaluated on the basis of evidence. Similarly, Kuhn (1999, p. 23) states that "the development of metacognitive

understanding is essential to critical thinking because critical thinking … involves reflecting on what is known and how that knowledge is justified … coordination of theory and evidence [are] … put them in a position that evaluates the assertion of others." This statement suggests the relevance of using critical thinking for integrating teaching and research through research projects in attempt to overcome surface learning. In line with Brasov (2007, p. 68), "research which is finest prepared in tandem with teaching is the process by which facts, concepts, hypotheses and theories are examined, revised and build upon a more complete understanding of the universe, nature, culture, society and the human mind and body." This indicates that integration of teaching and research should occur in the environment of enquiry which includes deep understanding of knowledge.

According to Baldwin (2005, p. 9), "it can be argued that the quality that makes higher education 'higher' and quite different from training is that it is grounded in the deep understanding of the provision of knowledge. This encompasses not just awareness that knowledge is always changing and growing, but is constantly challenged and revised…" This suggests the use of deep approach to learning in order to understand knowledge as Biggs and Tang (2007, p. 24) argue that "the deep approach to learning arises from a felt needed to engage the task appropriately and meaningfully, so the student tries to use most appropriate cognitive activities for handling it." For example, learning through research projects involving deep research can lead students to employ deep approach to learning. For Brockband and Mcgill (1998) deep learning included active approach to learning involving understanding of the key ideas and their interconnections in order to make sound conclusions.

Jenkins and Healey (2009, p. 6) argue that "one of the effective ways to engage our students in research and inquiry … is to move curricula in direction of developing students as participants in research and inquiry, so that they are producers, not just consumers of knowledge." In this context, research-based curriculum can help students develop their research skills as Zeschel (2010) supports that research-based teaching focuses on enquiry-based activities in which students act as researchers and both lecturer and students are learners. However, this requires the change from the teacher-centred curriculum based on transmission of prescribed subject contents to a

student-centred curriculum based on more open enquiry.

On the whole, students in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM conduct research projects during their courses as one of the major indicators of the research-based curriculum (see figure 5 on page 37). Notwithstanding, the research projects that students in the EELC and EELC conduct lack scholarship which includes critical thinking. Moreover, the projects of the students are undertaken in environment of surface/strategic approach to learning which is the major attribute of integrating teaching and research through the variable research-led (see figure 6 on page 39). This way of integrating teaching and research tend to fulfil a routine of testing or examination purpose which is the one of the main indicators of the variable research-led outlined in see figure 5 (see page 37). Given these facts, I may conclude that the integration between teaching and research through the variable research-based in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM is very low according to the scale of the research-teaching nexus depicted in figure 5.

5.3.2 The variable research-tutored curriculum and the integration of research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section discusses the research findings related to integration of research and teaching through the variable research-tutored in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

The integration of research and teaching through the variable research-tutored in the EELC and CELC show similarities and differences. In terms of similarities, table 17 (see page 99) demonstrates that 71.4% of lecturers in the EELC and 71.4% of lecturers in the CELC provide students compulsory bibliography in order to read and produce academic essays. Similarly, table 16 (see page 96) indicates that 69.5% of students in the EELC and 78.2% of students in the CELC write academic essays based on bibliographical guidance provided by their lecturers. Furthermore, table 16 shows that 71.5% of lecturers in the EELC and 100% of lecturers in the CELC involve their students in presentation of academic essays in pairs or groups. Likewise,

100% of students in the EELC and 95.6% of students in the CELC present academic essays in groups for class discussion throughout their courses. Moreover, table 17 (see page 99) indicates that 71.5% of lecturers in the EELC and 85.8 % of lecturers in the CELC engage their students in literature review and critique. However, table 12 and table 13 (see page 88 and 90 respectively) reveal that although students in the EELC and CELC write and present essays for class discussion, they lack skills in questioning or criticising the literature and adapting it to the reality leading to a surface approach to learning at the expense of a deep approach to learning.

In accordance with Healey (2005), research-tutored curriculum consists of learning in which students write and discuss assignments such as essays and papers. In line with Healey, Jenkins and Lea (2014), a curriculum can be research-tutored when students and lecturers in the discipline are critically engaged in research discussion, for instance in seminar activities.

Biggs and Tang (2011) argue that learning activities can make learners adopt surface approach to learning in higher education as a response to the method of teaching. The authors maintain that surface approach to learning consists of too low level activities that result in reproduction of knowledge in order to achieve the intended learning outcomes. Whereas, deep approach to learning entails high level activities which challenge learners to think critically, reflect, hypothesise, apply knowledge and so forth in attempt to achieve the intended learning outcome. Thus, the surface and deep approach to learning should be considered as a response to teaching rather than personal traits. In this perspective, students in the EELC and CELC use surface approaches to learning resulting in reproduction of knowledge.

According to Entwistle (1994), approaches to learning comprise deep approach, surface approach and strategic approach. In this case, the main intention of the deep approach to learning is transformation [construction or deconstruction] of knowledge involving, for instance, the examination of logic as well as patterns, principles and evidence in a careful and critical way, establishment of the relationship between new ideas and previous knowledge and so forth. In the deep approach, understanding results in construction or deconstruction and integration of knowledge in the way one

views the reality and this involves meaningful and active learning. By contrast, the intention of the surface approach to learning is reproduction of knowledge and entails content knowledge and tasks leading to, for example, recalling of unconnected pieces of information or knowledge and procedures repeatedly without production of new ideas. In other words, surface approach to learning is based on rote learning underlying repetition of knowledge or consumption of unelaborated information to reproduce the material. Meanwhile, the intention of the strategic approach to learning is the organisation of methods of the study and management of the time for the study. This strategic approach is rooted from a deep approach and surface approach to learning and it is shaped by the perception and requirement of teaching [methods] and assessment procedures. This means that if teaching [methods] and assessment procedures require demonstration of understanding or factual and procedural recall, one can adopt a deep approach or a surface approach respectively. In this context, the main features of strategic approach consist of making consistent effort into studying, finding the right conditions and material for studying, compliance with knowledge obtained from lectures and awareness of assessment requirements and criteria in order to be good at assessment tasks as well as effective management of time and effort to maximise academic records.

In line with Rhem (2009, p. 3) "…a deep approach [is] closely related to a conception of 'learning as transformation'. Students not open to the possibility that their learning will change them seem more likely to take a surface approach to their studies." In this view, a deep approach may foster active learning and critical thinking as well as the use of scholarship discussed previously in attempt to integrate teaching and research together. In contrast, a surface approach may lead to passive learning consisting of knowledge memorisation and reproduction. Houghton (2004) argues that deep learning promotes understanding and application of knowledge for real life because it involves critical analysis of new ideas. At the same time, deep learning helps to understand the concepts [or theories] in a meaningful way by establishing the relationship between the existing knowledge and new knowledge and this in turn can help to keep the concepts in a long term memory and retrieved when it is needed to solve problems in a novel contexts. By contrast, surface learning comprises

memorisation of isolated information for the purpose of assessment leading to poor understanding and ability to keep knowledge in a long term memory. Notwithstanding, one may adopt either deep or surface approach to learning as a result of teaching [methods] used for the process of learning. In terms of teaching methods Healey (2005, p. 4) states that "teacher focused [method] emphasises transmission of research knowledge to a student audience, whereas student focused [method] emphasises students constructing their own knowledge through active participation in class." This statement means that there is a relation between teaching methods and learning approaches. In this case, a student-focused method to teaching is aligned to deep approach to learning including scholarship, while a teach-focused method to teaching is aligned to surface approach to learning involving memorisation and reproduction of knowledge. In this perspective, lecturers in the EELC and CELC tend to use the teacher-centred method to teaching making students adopt a surface approach to learning. The extracts which indicate this particular analysis come from the interviewees in the EELC and CELC as follow:

[Interviewee 3] in table 2 (see page 60) states that "I think that the lecturers should not demand critical literature review as such, but they should develop appropriate activities that may help students analyse the literature deeply and criticise it…" In addition, [Interviewee 4] in table 2 (see page 60) notes that:

> *Even though students have conducted research throughout their course, it is the poor quality due to the lack of critical view and supervision. In this case, I think that lecturers should give more priority to critical research because students read and reproduce knowledge. This means that we have limitations on how to do research. In spite of having the discipline of Research Methods, I think it is not enough.*

Moreover, in table 12 (see page 88), [Interviewee 3] admits that:

> *I teach my students how to do literature review and critique. However, I have noted that when students do literature review, they do not question the literature and they do not adapt the literature to our*

> *reality as most literature is Brazilian. Despite lecturers demanding students to do literature review and critique as well as correct use of citations and bibliography, students have many problems concerning with these issues. Instead of doing literature review and critique students, mainly from year 1, year 2, and year 3, read and transcribe information specifically from internet and sometimes students do not write the reference in their work. Furthermore, during the literature review, students do not discuss concepts with more than two or three authors who could help students develop a variety of ideas and critical thinking.*

Finally, [Interviewee 3] in table 13 (see page 90), states that "we … have criticised students regarding to literature review since the students like going directly to the objective… they do not deeply discuss what is around the problems…. although students do research and find out some answers, the sources are not reliable and others contain errors."

The discussion that follows focuses on the differences of integrating teaching and research between the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM through the variable research-tutored. Table 14 (see page 93) shows that in the EELC there is a variety of teaching-learning activities that may foster students to interact in group for discussion of ideas or knowledge such as essays, tutorial groups, workshops, seminars and case study analysis. In contrast, table 15 (see page 94) indicates that in the CELC there is a lack of variety of teaching-learning activities that may foster students to interact in group for discussion of ideas or knowledge and these activities consist of project studies for construction, use and maintenance of construction works. Furthermore, comparing table 32 (see page 128) and table 33 (see page 130), it can be seen that there is less group interaction in the classroom for presentation and discussion of knowledge or ideas in the CELC rather than the EELC. Ozay (2013, p. 79) argues that "research-tutored approach is proposed to deepen the learning by discussing the ins and outs of research experience (emphasis on content)." This means that although research-tutored focuses on the content, it should discuss knowledge beyond the discipline through scholarship

of integration. Nonetheless, epistemology of disciplines in the CELC contributes to less group interaction of students in the classroom for discussion of knowledge or ideas comparing with epistemology of disciplines in the EELC. Robertson (2007, p. 551) states that "academics' epistemologies are not only influenced by the way knowledge is conceived of and structured within their discipline, but that these epistemologies play a fundamental role in shaping experiences of research, teaching and learning , and of constructing…relation between research and teaching…." This suggests that knowledge conceptualisation and beliefs in the discipline shape the integration of research and teaching as Trowler (2009) sustains that in terms of theoretical concepts and approaches in relationship between knowledge, teaching and learning is shaped by key elements: type of discipline, teaching learning regimes (a set of rules, assumptions and practices and their linkage to teaching and learning) and the discourse subject position, that is to say, the language and the reality in the discipline. In this context, disciplines may be restricted to integration with other disciplines. At the same time, disciplines have different theories of teaching and learning, values, attitudes and kinds of assessment. Likewise, the discourse subject position of disciplines influence how their followers act, view and construct the reality. The author maintains that disciplines consist of three factors: structural side, agentic side and education ideology. Structural side entails power of discipline and culture while agentic side includes a social structure and rules used in the community of practice and finally education ideologies shape the socialisation of members in the community of practice. These three factors influence how students and lecturers give meaning to the social world in the teaching-learning process according to their background knowledge or experience. From this argument, it can be perceived that disciplines influence the integration of research and teaching as well as learning in higher education.

In line with Trowler (2006), disciplines may be classified into hard and soft disciplines as well as pure and applied according to their cognitive dimension. In this case, hard disciplines have a hierarchical position of their disciplines leading to acquisition of knowledge in ranked way, that is, the acquisition of knowledge follows an ordered sequence of priorities. In addition, hard disciplines have well-developed

and predictable theories as well as causal propositions and universal laws that produce generalisable findings. Meanwhile, soft disciplines have a broad scope which allows adding complex details to the finding. Likewise, soft disciplines have general structures of theories and they are flexible to accommodate current situations and a large scope of approaching problems. By contrast, pure disciplines have a system that helps to control themselves and make their own rules. Besides, pure disciplines are theoretical and more detailed in dealing with professions or problems. Finally, applied disciplines are more concerned with concrete problems or data rather fundamental principles and these disciplines are governed and shaped by external influence such as body of rules binding human society. In this view, disciplines from environmental education are soft and applied while disciplines from engineering are hard and applied. As a consequence, this influences the link between teaching and research in higher education.

Healey (2005) asserts that comparing hard disciplines with soft disciplines in relation to integration of teaching and research through subject content, the integration is more challenging in hard disciplines rather soft disciplines since knowledge in the former is more hierarchical and cumulative rather than the latter especially before the final year of the undergraduate course. Clark (1983, p.39) notes that [engineers] "arrange their courses in specific sequence and distinguish clearly between beginning, intermediate and advanced students… they establish barriers all along the way, guarding the door to the classroom with prerequisites." This means that engineering courses are more concerned with content knowledge based on disciplinary discourse. According to Ensor (2004) disciplinary discourse emphasises on development of concepts, structures and modes of argument taught by a lecturer as an expert of the discipline, yet the content knowledge is not related to real life situations or problems.

As can be seen by the data in table 10 (see page 76), students in the EELC conduct class discussion in groups in which some lecturers facilitate the discussion, but other lecturers select one of the students in the class to facilitate the presentation and discussion. Whereas, table 11 (see page 78) shows that students do group presentations and discussion of assignments in the class facilitated by their lecturers. In this view, interactions in groups for presentations and discussions of assignments

through facilitation by the students may foster more a student-centred method to teaching in which students are more active participants in teaching-learning process and this can help to integrate teaching and research in higher education. Kreber (2009, p. 8), states that "one promising way of enhancing teaching and research synergies at undergraduate level implies helping students appreciate that knowledge in the subject itself is socially constructed and contested." This assertion suggests that integration of teaching and research [in higher education] can be enhanced by interaction of students in the discipline in order to explore knowledge by examining and questioning. However, Barnett and Coate (2005, p. 129) note that "the tutor has to open spaces in front of the student and this injunction calls in turn for the tutor's engagement in situ. This engagement takes place both horizontally and vertically. Horizontally, the tutor has to have a personal stake in the student's becoming, in the three domains of knowing, acting and being…" This suggests that the lecturer in teaching-learning process should not only be a knowledge transmitter, but also a participant in the sense of a learner who helps students to integrate content knowledge (know what) and competences (know how) as well as generic skills such critical thinking and interpersonal skills.

Kirk, Macdonal and Tining (1997, p. 68) asserts that the main position in [higher] education today is constructivism which is based on the conception that learners actively raise their own knowledge on the foundation of their experiences and knowledge…." Meanwhile, constructivism encompasses cognitive and social (interactionist) perspectives as Wiggin, Wiggin and Zanden (1997, p. 3) note that:

> *The cognitive perspective emphasises that we cannot understand [students'] behaviour without understanding their mental processes. [Students] do not respond automatically to their environment. Instead their behaviour depends on how they perceive and think about their environment…. On the other hand, interactionist perspective emphasises that [students] are active agents in determining their own behaviour and establishing social expectations. [Students] negotiate with each other to construct their interactions, expectations and interpretations."*

Notwithstanding, it is necessary to discuss some learning theories that advocate constructivism. According to Hutchison and waters (1987), cognitive theory and affective factor theory are some of learning theories of constructivism. Cognitive theory focus on learning centred on the learner in which he/she is actively involved in the learning process and interpret knowledge in a meaningful way according to his/her experience so cognitive theory relies on problem solving tasks. By contrast, affective factor theory underlies motivation of the learner towards learning and advocates that how learning is conceived by the learner affects the learning process. In other words, desire to think about something leads to active learning. In this case, relationship exist between the cognitive theory outlined earlier and the affective factor theory in the sense that successful active and meaningful learning advocated by the cognitive theory depends on the motivation, that is, affective factor theory.

Healey (2005, p. 72) states that every single discipline can benefit from a student-centred method, nonetheless this method is shaped by teaching-learning process of disciplinary culture in the department and institution. Nevertheless, Mazula (2015) argues that there is an inappropriate way of using a student-centred method in the process of teaching and learning in higher education. For example, lecturers believe that giving their undergraduate students, mainly from year 1 and year 2, a thematic plan with suggested bibliography and telling them to do enquiry activities it is enough since the curriculum plan of the university advocates a student-centred method. Thus, the lecturer after giving students the task, he/she leaves them on their own for weeks. Then the lecturer comes back to the classroom to devise a test. Furthermore, when the lecturer notices that the semester is at the end, he/she gives intensive lectures covering some weekends and holidays. In this way, the lecturer uses a teacher-centred method at expense of a student-centred method. The author goes on arguing that the student-centred method heavily requires lecturer's [facilitation] for learning process. Therefore, in a pedagogical point of view, the student-centred method should not be considered as a learning strategy taken for granted. In this case, there is the need for higher education institutions to train their lecturers on the issues concerning with a student-centred methodology so that the lecturers can use this methodology appropriately in teaching-learning process. Elton (2001, p. 7) supports that "clearly,

[lecturers] as facilitators of learning must have teaching skills, well beyond those needed by traditional [lecturers], and they have to be versed in the scholarship of their discipline." This means that lecturers should be aware of the student-centred method for the teaching-learning process and the integration of scholarship discussed previously in this chapter in order to help students learn in the environment where teaching and research are brought together.

In short, the attributes of a teacher-focused method: knowledge transmission and passive learning as well as attributes of a student-focused method: interaction of students in groups for presentation and discussion of knowledge were discovered in the EELC of the Faculty of Education and CELC of the Faculty of Engineering at UEM, but the teacher-focused method predominates in both courses. Thus, I may conclude that the integration between teaching and research through the variable research-tutored is very low in the EELC and CELC due to the predominance of the teacher-focused method in which the teaching staff transmit knowledge to the students through lectures as one of the main indicators of the variable research-led (see figure 5 page 37). In addition, students learn about others' research without critical view as another indicator of the variable research-led (see figure 5). Furthermore, the teacher-focused method involves learning through behaviourist theories in which students are passive learners resulting in surface/strategic approaches to learning that are the main attributes of research-led. As a consequence, this makes the integration between teaching and research very low since the learners are not involved in the scholarship which could foster a deep approach to learning and critical thinking skills.

5.3.3 The variable research-oriented curriculum and the integration of research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section discusses the research findings related to integration of research and teaching through the variable research-oriented in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

The integration of research and teaching through the variable research-oriented in the EELC and CELC shows similarities. Table 24 (see page 112) indicates that 65.2% of students in the EELC and 73.9 % of students in the CELC learn how to construct knowledge in the discipline through scenarios or situations of real life problems in the area of the study. At the same time, table 18 (see page 102) and table 21 (see page 107) from the EELC and CELC respectively show that lecturers in both courses create scenarios or situations of real life in the discipline for students to discuss. Likewise, table 24 (see page 112) demonstrates that 60.4% of students in the EELC and 60. 8% of students in the CELC are assessed on solving problems in the area of the study. In general, the data from the tables previously mentioned reveal that the EELC and CELC employ problem-based learning in order construct knowledge in the discipline as a way of bringing teaching and research together.

According to Griffiths (2004, p.772), "teaching can be research-oriented in the sense that the curriculum places as much emphasis on understanding the process by which knowledge is produced in the field… careful attention is given to the teaching of enquiry skills…" This means that research-oriented concentrates on teaching and learning of research processes in order to master research skills as Healey (2005) sustains that teaching of research processes and problems in the discipline is the main focus of the research-oriented curriculum. In this context, the research-oriented curriculum aims to introduce research methods for knowledge construction processes in the discipline as well as resolution of problems in the discipline through problem-based leaning.

Prince, Richard and Brent (2007, p. 206) argues that "an alternative way to integrate research into the classroom, … in terms of improving students' learning is to teach in

a manner that replicate research process, by using, e.g. inductive teaching approach such as enquiry-based learning or problem-based learning." This statement suggests that teaching of research process in the classroom by way of enquiry and problem-based learning can help to link teach and research in the discipline. According to Walker (2015), differences exist between Enquiry-based learning (EBL) and problem based learning (PBL). The author argues that EBL underlies a student-centred approach in which students play a role of active participants and the lecturer plays a role of a tutor (advisor) and facilitator of the learning process. In this context, the lecturer gives students input and encourage them to think critically. The main aim of EBL is to develop research skills such as questioning, critical thinking and problem solving. Thus, EBL follows a general sequence of a research question, research methods and methodology, data collection, analysis and discussion of new findings. Overall, EBL is a core activity in [higher education] which fosters students to practise research methods for solving or providing answers to authentic problems or questions. The author goes on arguing that PBL also underlies a student-centred approach in which the student plays an active role in learning process and the lecturer plays a role of a facilitator, but he/she does not give input to students concerning with the problem to be discussed since this is considered as the responsibility of the students. Besides, PBL aims to improve students' skills in application of knowledge in order to solve problems critically. Meanwhile, the central point of PBL is that what is to be learnt is not a hierarchical list of topics, but it is content knowledge and skills around the problems requiring the learners to be responsible for solving the problems. In this way, interaction exists between knowledge and the problem, as a result, this can help to develop the nexus of research and teaching in higher education.

Sproken-Smith (2007) states that enquiry-based learning consists of a student-centred method leading to understanding the process of construction of new ideas. Further, in enquiry-based learning, students are responsible for their learning so they play an active role while the lecturer plays a role of a facilitator. The author notes that enquiry-based learning may be divided into structured and guided or independent research. In the former, the lecturer formulates questions and guidance for students to solve the problems while in the latter students formulate their own research questions

and select appropriate methods and methodology to conduct research. Biggs and Tang (2007, p. 5) state that "problem-based learning would be an example of an active teaching method, because it requires students to question, to speculate, to generate solutions…" This suggests that, the problem-based learning involves a student-centred method in which the student is an active participant in the teaching-learning process while the lecturer is a facilitator of the process leading to deep learning and integration of scholarship. On the contrary, Savin-Baden (2000) sustains that problem-based learning can be either teacher-centred or student-centred in spite of using problem scenarios for learning. In this context, problem-based learning is teacher-centred when it involves learning through problem scenarios for discussion in a single discipline without connecting it with other disciplines and in this kind of learning, students are expected to provide predictable answers or solutions to problems from the input provided by the lecturer. At the same time, the solutions are concerned with mastering of relevant knowledge content in the discipline in order to develop professional competence of the student. Conversely, the author maintains that problem-based learning is student-centred when it comprises learning through problem scenarios in which students work in groups or teams to solve problems loosely guided by the lecturer, as a consequence, students become independent researchers. In this way, students are expected to formulate their research questions or hypotheses to provide solutions to problems by exploring a broad scope of information integrating their real life experience and existing knowledge. According to the overview of the problem-based learning given previously, the EELC and CELC employ more problem-based learning aligned to a teacher-centred method rather than a student-centred method. The passages which illustrate this particular analysis come from the interviewees in the EELC and CELC as follow:

In table 18 (see page 102), [Interviewee 5] acknowledges that:

> *The lecturers have created scenarios of real life problems in the area of the study for students to discuss…. Nonetheless, the creation of scenarios for discussion depends on the discipline, yet some specific lecturers bring these kinds of scenarios for discussion mainly in the discipline of Didactics of Materials as well as Natural Sciences and*

> *Environmental impacts…. During this activity, we were divided into groups and we were given some worksheets with a scenario about the assessment of the environmental impact to discuss possible steps to take for mitigation of the situation.*

Likewise, in table 19 (see page 103), [Interviewee 1] asserts that some lecturers bring situations or scenarios about real life problems in civil engineering. For example, the lecturers present a situation about a landslide in place x or damage of a road and possible causes and students discuss possible solutions to avoid this type of situation….” Furthermore, in table 20 (see page 106), [Interviewee 3] states that “creation of scenarios or situations for discussion in the class depends on the discipline. In the discipline that I lecture,… I create scenarios and I raise a daily situation about environmental education, for example how you would involve a community in a situation x.” In addition, in table 21 (see page 107), [Interviewee 1] emphasises that “we have created scenarios about real life problem in the discipline for students to discuss….”

As has been demonstrated in the previous passages from the findings obtained through the variable research-oriented, the EELC and CELC use problem-based learning associated with a teacher-centred method since learning occur in a particular discipline without interconnection with other disciplines, Besides, lecturers create scenarios and provide inputs for students to learn. As a result, this contributes to a surface approach to learning discussed in the previous sub-sections. According to Schunk (2012, p. 22), conceptualisations of learning have important implications for [higher] education practice. Behavioural theories imply that [lecturers] should arrange the environment so that students can respond properly to stimuli.” This means that from the perspective of behaviourist theory, learning occurs in the environment where the lecturer provides input to their students. Huttchison and Waters (1987) sustain that the behaviourist theory consist of learning through external input provided to the learner in stimulus-response sequence and repetition for effective learning in which the learner is a passive receiver of the external input provided by the lecturer in the framework of a teacher-focused method or information transmission. This suggests that the behaviourist perspective views learning as knowledge transmission in the

discipline where the learner is a passive participant resulting in surface or strategic learning approaches. However, this kind of learning lower the integration between teaching and research in higher education due to exclusion of scholarship such as scholarship of integration and application that may lead to deep learning discussed in the previous sub-sections.

The discussion that follows is related to internship activities that students in the EELC and EELC do in their disciplines throughout their courses in order to integrate theory and practice and develop professional skills. As can be seen from the data in tables 22 and 23 (see pages 109 and 110 respectively), students in the EELC and CELC do internships during their courses in order to integrate theory and practice and develop know how skills in the professional area of training.

In line with Barnett and Coate (2005), competences obtained through doing, that is, the action domain is one of the main characteristics of professional subject areas. Biggs and Tang 2007, p.10) note that "…competency-based education are narrow competencies such skills. For this reason, competency-based education is common in vocational… education." In this view, the research-oriented curriculum is competency-based since it focuses on professional skills. In this context, Karseth (2006) argues that vocational curriculum discourse entails learning by doing in order to integrate not only theory and practice but also to develop particular professional skills required by special professions in a particular specialised area. The author goes on arguing that the teaching method in a vocational curriculum is teacher-centred in which the relationship between the lecturer and the student is like a master and apprentice or superior and subordinate. Consequently, students learn through direct instruction given by the lecturer leading them to employ a surface or strategic approach to learning in spite of incorporating some elements of the scholarship of application when they integrate theory and practice throughout the internship activities. However, according to Boyer (1990), scholarship of application is related to the ability of deep and critical understanding of the integration of theory into practice through the process of peer evaluation. In this view, the internship activities conducted in the EELC and CELC do not lead to full scholarship of application due to the use of surface approaches to learning rather than deep approaches to learning.

Jenkins et al. (2003) note that "linking teaching and research is achieved when: students learn how to research within their discipline leads to knowledge creation… [and] students learn the methods used to carry out research in their disciplines…" This means that students in higher education should learn research methods and use them for construction of knowledge in their discipline. Nonetheless, Elton (2005) observes that the tendency of mass higher education nowadays and the need of specialised labour market have motivated lecturers to train students for job market rather than researching because research in a single discipline is so specialised that merely demands the mastering of skills needed for future professions.

Overall, the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM employ problem-based learning in the framework of the teacher-centred method in which the lecturer provides problem scenarios that lead students to give predictable answers. In this case, the aim of the proble-based learning is to develop knowledge content and professional skills of the learners in a single discipline. Therefore, I may conclude that the integration between teaching and research through the research-oriented curriculum in the EELC and CELC is low according to the scale of the research-teaching nexus outlined in figure 5 (see page 37) since students learn how to construct knowledge in a single discipline through problem-based learning which is the main indicator of research-oriented. Nevertheless, problem-based learning underlies the teacher-focused method rather than the student-focused method because it is tightly guided by the lecturer resulting in learning through behaviourist perspective for knowledge transmission in a particular discipline. Likewise, problem-based learning involving the teacher-focused method make students passive participants who adopt a surface or a strategic approach to learning as a way of linking teaching and research in higher education (see figure 6 on page 39).

5.3.4 The variable research-led curriculum and the integration of research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section discusses the research findings concerning with integration of research and teaching through the variable research-led in the EELC of the Faculty of

Education and the CELC of the Faculty of Engineering at UEM.

The integration of research and teaching through the variable research-led in the EELC and CELC show similarities in both courses. Table 33 (see page 130) demonstrates that 73.9% of students in the EELC and 65.2% of students in the CELC use others' research such as dissertations or theses for learning how to do research. Meanwhile, table 34 (see page 133) indicates that 71.5% of lecturers in the EELC and 85.7% of lecturers in the CELC present current research in the discipline during lectures. Besides, table 30 and table 31 (see page 126) from the EELC and CELC respectively suggest that the teaching-learning methods in both courses are centred on the lecturer and the role of the lecturer is to give information. Likewise, in both EELC and CELC, the teaching-learning activities consist of lectures and these activities are assessed through tests and examinations. Overall, the data presented earlier indicate that the EELC and CELC use aresearch-led curriculum in attempt to integrate teaching and research in higher education.

In line with Griffiths (2004), a research-led curriculum consists of teaching and learning of content knowledge of a special area of the study in which the lecturer decides what to teach and learn according to his or her interests in the area. Thus, the research-led curriculum relies on the teacher-centred method or information transmission. Furthermore, the main aim of the research-led is to understand the findings obtained through others' research rather than the process involved in doing research. Consequently, there is no much effort to do in order to bring teaching and research together. Ozay (2013) states that research-led helps students understand content knowledge, that is, body of knowledge directly related to the discipline and this involves learning current research in the discipline as a way of introducing the content knowledge in the discipline. In this context, content knowledge is what Biggs and Tang (2007, p. 81) consider as "declarative knowledge [which] refers to knowing about things, but because it is expressed in a symbol system is called propositional knowledge or content knowledge. Declarative knowledge… is in libraries and textbooks and on the internet; it is what the [lecturer] 'declare' in lectures. The learner's role is to receive the content…" This kind of learning suggests traditional methods of teaching such as a teacher-centred method or information transmission.

According to Healey (2005), research-led underlies a teacher-centred method in which the lecturer plays an active role of knowledge transmission while the student plays a passive role of an audience. In this view, the teacher-centred method emphasises that the lecturer is the source of knowledge and students learn through instructions given by the lecturer leading to a surface approach to learning and absence of scholarship in the process of teaching and learning. The extracts, which illustrate this particular analysis, come from the interviewees in the EELC and CELC as follows:

In table 27 (see page 119), [Interviewee 1] says that "the lecturers in my course are more concerned with giving information. For example, they raise or explain issues that we should know and pay attention to them." While, in table 26 (see page 118), [Interviewee 4] states that "...the lecturer gives students an article to read and identify its strengths and weaknesses or the lecturer gives students the general idea of what students should extract from the article. Nonetheless, students focus more on the content, that is, the main ideas of the article and the conclusion of the author."

In table 28 (see page 123), [Interviewee 1] claims that:

> *I have presented current research in the discipline as a model for students to learn how to do research since it is one of the ways to show how students can do research and stimulate students' research. This way can help students be aware of the formulation of research aims…recent research can be a model for students to see how things are done, for example how to deal with a research topic, literature review or data discussion.*

In table 29 (see page 124), [Interviewee 3] believes that "…it is a good idea to use the research already done as a model for students to do research…so the lecturer should provide students input and some of the input can be a model of the research already produced for the students to see how things are done in a research project." However, the input related to scholarship can help to develop the nexus between teaching and research in higher education as Elton (2001) argues that the input of scholarship can enhance the link between teaching and research when there is a change of the process

of learning from teaching excellence centred on the lecturer to learning excellence centred on the students' learning experiences. The teaching excellence centred on the lecturer underlies a lecturer-centred method in which the lecturer and the students play an active and passive role respectively in the process of teaching and learning. Notwithstanding, traditional lecturers believe that the lecturer-centred method may develop the link between teaching and research for the most able students who are expected to become the future lecturers in higher education. Whereas, the learning excellence centred on the students' learning experiences underlies a student-centred method in which the students play an active role in the process of teaching and learning. Consequently, all students are actively involved in developing the link between teaching and research in higher education.

Jenkins (2000) notes that knowing the subject taught by the lecturer… as well as passing [tests and] examinations are the main interests of students in the process of teaching and learning [in the lecturer-centred method]. This means that the lecturer-centred method relies on summative assessment such as tests or examinations in order to assess the content knowledge transmitted by the lecturer. As a result, this kind of assessment contributes to the lack of link between teaching and research since it is concerned with assessment of knowledge already produced rather than discovery of new knowledge or construction/deconstruction of knowledge. Brew (2006, p. 119) supports that "…traditionally pedagogies of mistrust of students have dominated higher education, witnessed in the over-use of summative assessment, covering of course material, and the pretense of certainly and truth of propositional knowledge in some disciplines." This suggests that traditional pedagogies that include a lecturer-centred method to teaching focus more on summative assessment in order to consolidate content knowledge or propositional knowledge taught by lecturers. The extracts demonstrating this specific analysis come from the interviewees in the EELC and CELC as follows:

In table 27 (see page 119), [Interviewee 4] states that "we do written tests or laboratory tests and examinations during and at the end of the semester respectively… to consolidate the knowledge taught in lectures." Similarly, in table 28 (see page 123) [Interviewee 1] says that [lecturers] have given some written tests and examinations

to [their] students as assessment activities…during the course…' Furthermore, table 30 and table 31 (see page 126) concerning with the curriculum discourses of the EELC and CELC respectively reveal that in both courses the assessment activities consist of tests and examinations. Besides, table 35 (see page 135) indicates that 85% of lecturers in the EELC and 100% of lecturers in the CELC assess their students on written tests or examinations during or at the end the semester or year. At the same time, table 34 (see page 133) shows that 100% of students in the EELC and 95.7% of students in the CELC write tests or examinations during or at the end the semester or year.

Trowler, Saunders and Murray (2012) state that outcomes-based assessment such as tests and examinations aims to assess the objectivity of knowledge, therefore, this kind of assessment involves model answers and guides. Biggs and Tang (2007, p. 5) claim that "outcomes-based teaching and learning is convenient and practical way of maintaining standards and of improving teaching… assessment being the means of checking how well they have been met." This suggests that teaching and learning aligned to outcomes-based assessment or summative assessment aims to measure the content knowledge, for example, facts or concepts acquired by the students through lectures. Notwithstanding, Entwistle (2000, p. 12) sustains that "learning in higher education is more than just acquiring facts. It also includes…helping students to make sense and meaning of the real world and interpreting what we know and how we know it…" This implies that learning in higher education entails critical thinking and integration of scholarship as a way of bringing teaching and research together.

On the whole, the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM predominantly use a lecture-centred method in which the role of the lecturer is to transmit prescribed body of knowledge in a particular discipline through lectures. Nonetheless, the student plays a passive role in teaching-learning process which consists of learning the body of knowledge transmitted by the lecturer resulting in a surface approach to learning including reproduction of knowledge and summative assessment such as tests or examinations as the main interests in the process of teaching and learning. Thus, I may conclude that the integration between teaching and research through the variable research-led curriculum in the EELC and

CELC is very low according to the scale of the research-teaching nexus given in figure 5 (see page 37) because both EELC and CELC rely on lectures, traditional written tests or examinations which are the main indicators of the research-led curriculum.

5.3.5 Teaching practices in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering-UEM

This sub-section discusses the research findings related to teaching practices in attempt to integrate teaching and research in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

The integration of teaching and research through teaching practices in the EELC and CELC show similarities. For example, tables 30 and 31 (see page 126) reveal that the teaching-learning methods of the EELC and CELC are centred on the lecturer and the role of the lecturer is to give students information. Therefore, students in the EELC and CELC listen to their lecturers' presentations and take notes during lectures (see table 32 on page 128 and table 33 on page 130 respectively). This indicates a relationship between the old teaching methods suggested by the curriculum designs in the EELC and CELC (see tables 30 and 31 on page 126) since the teaching practices in both courses involve a lecturer-centred method and a behaviourist perspective to learning.

In line with Tight (2003), in higher education, lecturers provide information or knowledge for students to learn. In this context, the basic activities in higher education enterprise involves the business of teaching and learning in which lecturers gives information to students through lectures and the student concentrate on the information given by the lecturer. Brew (2003, p. 7) states that "[lecturer-]focused approaches such as lectures, where students are predominantly an audience and the [lecturer's] attention is focused on their own research and telling students about it fail to recognise the importance of undergraduate research as a way of transforming higher education experiences and ultimately higher education itself." This statement suggests that in a lecturer-focused method, the lecturer plays an active role while the student plays a passive role. In this context, the role of the lecturer is to give students

information and the role of the student is to receive and reproduce the information provided by the lecturer. In this view, learning in a lecturer-centred method underlies behaviourist theories.

Schunk (2012) argues that learning through behaviourist theories is regulated by environmental factors [stimuli] and these factors determine the change of behaviour or response. In a behaviourist perspective, learning is observable phenomena caused by stimuli rather than complex internal factors such as thoughts, beliefs and feelings. According to Leonard (2002), the assumption of a behaviourist theory is that teaching follows a sequence of stimuli elicited by the lecturer and responses given by the learner. At the same time, a behaviourist theory is concerned with teaching determined by fixed and predictable learning objectives as well as observable learning behaviour of these objectives and their assessment. In other words, the behaviourist theory not only focuses on behaviour of the learner prescribed by the learning objectives but also it focuses on the results of tests or examinations as assessment of the learner's behaviour towards the learning objectives. As a result, the behaviourist theory is related to learning output of isolated content knowledge through stimuli and response sequence leading to the lack of interconnection of knowledge in the discipline or beyond the discipline. However, Hilgard and Bower (1975) sustain that responses to stimuli may result in two types of learning: respondent learning and operant learning. Respondent learning consists of eliciting responses from known stimuli through the process of stimulus and response association in an unconscious way, thus, this process is measured by the principles of reflexes. By contrast, operant learning does not depend on elicitation of known stimuli and its effectiveness is measured by the quantity and the quality of responses given rather than reflexes. Meanwhile, similarities and differences exist between respondent learning and operant learning since the two types of learning underlie stimuli. Nevertheless, in operant learning the stimuli are not as elicited as in respondent learning through reflexes. In this view, Rehfeldt and Hayes (1998, p. 193) maintain that "…operant and respondent behaviour are similar in that both always occur in the presence of stimuli and never in their absence, is the contention that the operant-respondent distinction has been made on the basis of single instances of

behaviour….” This suggests that the learning process through the behaviourist theory is conditioned by the stimuli, that is, the input provided by an external agent such a lecturer in order to inspire learning. In line with Leonard (2002), the behaviourist theory of learning is teaching-centric in the sense that it is concerned with controlled input and output resulting in surface learning rather deep learning discussed earlier. Consequently, this makes the integration between teaching and research very weak.

In short, the integration of teaching and research through teaching practices in the EELC and CELC consists of a lecturer-centred method in which the role of the lecturer is to transmit information in a single discipline while the role of the students is to listen to the lecturers’ presentation and take notes. In this case, students acquire knowledge in a particular discipline without interconnecting with other disciplines. As a result, this leads to surface learning comprising memorisation and reproduction of knowledge. Therefore, I may conclude that the integration between teaching and research through teaching practices in the EELC and CELC is very low since in both courses lecturers mostly play an active role of knowledge transmission through lectures while the students play a passive role of knowledge recipient leading to surface/strategic learning approaches to learning. In this context, lectures are some of the main indicators of research-led (see figure 5 on page 37) whereas surface/strategic approaches to learning are the major attributes of research-led (see figure 6 on page 39).

5.4 Summary of the discussion of the research findings of the study

The discussion of the research findings of this study was entirely based on the plurality of data obtained through a combination of different research methods, specifically, a qualitative interview, a documentary analysis, a quantitative classroom observation and a quantitative questionnaire in attempt to give meaning to the findings of the study. At the same time, the discussion of the research findings of this study was thoroughly based on four curriculum dimensions (variables), namely research-based, research-tutored, research-oriented and research-led and their teaching practices in order to understand the nexus between research and teaching from the research findings of the study in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. Notwithstanding, some research

findings of the study concerning with a nexus between research and teaching are self-contradictory in both the EELC and CELC of the faculties mentioned before. For example, the findings of the study from the documentary analysis reveal that the curriculum designs of the EELC and CELC suggest some research-based activities such as research-projects and fieldwork to be conducted throughout their courses in attempt to link research and teaching in higher education. Nevertheless, the findings from the interviews with lecturers and students as well as classroom observations in the EELC and CELC demonstrate that the research-based activities suggested by the curricula as plans in both courses are not effectively realised in practice. This means that there is a gap between curriculum designs as plans and their implementation in the EELC and CELC.

Overall, the findings of the study suggest that there is little combination of the four curriculum designs mentioned earlier or hybridisation among the curricula in order to develop the link between research and teaching in the EEL and CELC. However, the findings indicate the predominance of one of the four curricula, specifically the research-led curriculum involving indicators such as learning about others' research, lectures, tests or examinations (see figure 5 on page 37) as a way of linking teaching and research in the EELC and CELC. Moreover, the research-led curriculum is associated with the lecturer-focused method and surface/strategic approach to learning leading to reproduction of knowledge. Thus, the integration of research and teaching is very low in the EELC and CEL according to the scale of the research-teaching nexus depicted in figure 5.

CHAPTER 6 CONCLUSION OF THE STUDY AND RECOMMENDATIONS

6.1 Organisation of the conclusion chapter of the study

The conclusion chapter of this study is organised in six sections. The first section is concerned with the introduction of the conclusion chapter of the study which includes the aim of the study and research objectives as well as research questions. Likewise, this section involves the background information of the study and the importance of the topic in higher education. The second section presents a synthesis of the key findings of the study and their theoretical implications. The third section draws the general conclusion of the study. The fourth section gives the implication of the key findings of the study for practice. The fifth section provides the limitations of the study. Finally, the sixth section offers recommendations of the study.

6.1.1 Introduction

The aim of this study was to explore the concept of the research-teaching nexus from the point of view of curriculum designs: research-based, research-tutored, research-oriented and research-led as well as teaching practices in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM. At the same time, the aim of the study was to examine the teaching methods and learning approaches that have been used in order to link teaching and research in the EELC and CELC of the faculties mentioned before. Meanwhile, the study was guided by the following objectives:

- To identify, analyse, compare and contrast the curriculum designs used by the teaching staff to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.
- To relate the curriculum designs to teaching methods and learning approaches used to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.
- To identify, analyse and evaluate the types of teaching and learning activities, classroom interactions between the lecturer and students and/or the types of classroom interactions between students themselves as well as the role of the lecturer and the role of the students in the process of teaching and learning for

integration of teaching and research in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

The research employed a case study with four research methods: a qualitative semi-structured interview, a qualitative documentary analysis, a quantitative structured observation and a quantitative questionnaire. The research used both qualitative and quantitative research methods so that it could explore 3 research questions as follows:

1. What dimensions of curriculum designs have been used to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM?

2. What are teaching methods and learning approaches used to integrate research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM?

3. What are teaching practices used by the teaching staff to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM?

The research was a case study of UEM and was held from June to December 2015. This study involved final year undergraduate students from licenciatura degree and their teaching staff in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM.

The topic of the study is about 'The research-teaching nexus in Mozambican higher education curricula'. This topic is important since it focuses on curriculum designs mentioned previously and teaching practices that may contribute to the development of the link between research and teaching in higher education. In this context, the study may raise awareness of developing a link between research and teaching through curriculum designs and teaching practices in higher education. In this case, the link between research and teaching through curriculum designs and teaching practices may promote a student-focused method to teaching consisting of enquiry-based learning in which the students are active participants in teaching-learning

process. As a result, this may foster the use of constructivist perspectives and scholarship leading to deep learning as a way of linking teaching and research in higher education. In this way, students may be responsible for production, construction or deconstruction of knowledge under the assistance of the lecturer as a facilitator. Furthermore, enquiry-based learning may result in the relevance of the curriculum in higher education because students are involved in research-based activities that may stimulate them to conduct research on real life problems that affect society in general or communities. In turn, research-based activities may help students develop scholarship and generic skills such critical thinking, problem solving, communication and others needed for the academic life and the labour market.

6.1.2 Key findings of the study

This section provides a synthesis of the key findings of this study in order to answer the research questions of the study. As previously stated, the key findings of this study were obtained from exploration of four research questions. The first question was "What dimensions of curriculum designs have been used to link research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM?" In relation to this question, it was found that both EELC and CELC of the Faculty of Education and the Faculty of Engineering respectively emphasise more on research-oriented and research-led curriculum designs rather than research-based and research-tutored curriculum designs. The key findings obtained from questionnaires and interviews suggest a link between research and teaching through knowledge construction in a single discipline and learning about others' research which are the main indicators of the research-oriented and research-led curriculum respectively (see figure 5 on page 37). Concerning with research-led, table 25 (see page 114) demonstrates that 73.9% of students in the EELC and 65.2% of students in the CELC learn about research produced by others rather than producing their own research. Meanwhile, in table 28 (see page 123) [Interviewee 1] states that if students learn about others' research in the discipline, it can help them see how research is done, for example how to deal with a research process such as literature review or data discussion. Similarly, in table 29 (see page 124) [Interviewee 3] asserts

that "… it is a good idea to use the research already done as models for students to do research…so the lecturer should provide [students] input and some of the input can be a model of the research already produced for students to see how things are done in a research project. As can be seen in figure 6 (see page 39), learning about others' research involves lectures and traditional written/oral tests/examinations which are the main indicators of the research-led. In relation to research-oriented, table 33 (see page 130) reveals that 65.2% of students in the EELC and 73.9 % of students in the CELC learn how to construct knowledge in the discipline through scenarios or situations of real life problems. Likewise, in table 20 (see page 106) [Interviewee 3] says that "creation of scenarios or situations for discussion in the class depends on the discipline." In addition, in table 21 (see page 107) [Interviewee 1] states that lecturers create scenarios for students to discuss in the discipline. However, the discussion of these scenarios aims to consolidate factual or procedural knowledge taught through lectures in the discipline. In this case, lectures are the main indicators of the research-led (see figure 5 on page 37). Thus, I may conclude that the integration between research and teaching in the EELC and CELC is very low according to the scale given in figure 5 since in both courses student learn about others' research through lectures in order to consolidate the factual or procedural knowledge taught in the discipline rather than producing their own research projects.

The second question of this study was "What are teaching methods and learning approaches used to integrate research and teachingin the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM?" Regarding to this question, the key findings reveal that both EELC and CELC use more lecturer-focused methods to teaching and surface or strategic approaches to learning underlying behaviourist perspectives rather than student-focused methods to teaching and deep learning based on constructivist perspectives. In this context, the key findings obtained through the documentary analysis, interview and questionnaire support the use of the lecturer-focused methods to teaching and surface or strategic approaches to learning underlying behaviourist perspectives. Tables 30 and 31 (see page 126) indicate that the teaching methods of the EELC and CELC are centred on the lecturer and the role of the lecturer is to give students information. Consequently,

the teaching methods in the EELC and CELC are based on the lectures and assessment consisting of tests and examinations. Also, [Interviewee 1] in table 28 (see page 123) and [interviewee 1] in table 29 (see page 124) state that the assessment activities involve written tests and examinations. In addition, table 35 (see page 135) reveals that 85% of lecturers in the EELC and 100% of lecturers in the CELC assess their students on written tests or examinations during or at the end of semester or year.

The lecturer-focused method is associated with a surface or a strategic approach based on a behaviourist perspective to learning and absence of scholarship leading to reproduction of knowledge or information. Meanwhile, table 8 (see page 73) suggests that 87% and 86.9% of students from the EELC as well as 82.6% and 72.2% of students from the CELC undertake individual and group research projects respectively. However, in table 2 (see page 60), [Interviewee 4] notes that despite students have conducted research throughout their course, the research lacks quality because of nonexistence of a critical view and supervision. As a result, students read and reproduce knowledge. For example, in table 11 (see page 82) [Interviewee 5] states that "I have done literature review and critique, but one of the things that I have noted is that… we read and write everything we find and we consider it as absolutely right since we do not have abilities to criticise what is written." In table 12 (see page 88), [Interviewee 3] observes that "… instead of doing literature review and critique, students…read and transcribe information specifically from internet… [and] students do not discuss concepts with more than two or three authors who could help students develop a variety of ideas and critical thinking." In addition, in table 13 (see page 90), [Interviewee 3] says that students do literature review and deal with knowledge as objective, thus they do not deeply discuss the literature. The findings mentioned previously reveals that students in the EELC and CELC are concerned with surface or strategic approaches to learning as a way of integrating teaching and research. These approaches are results of a lecturer-focused method to teaching in which the lecturer transmits knowledge to students through lectures and assess the students by way of traditional written/oral tests/examinations (see figure 6 on page 39). At the same time, lectures and written/oral tests/examinations are the main indicators of the research-led

that contribute to very low integration between teaching and research in higher education according to the scale of the research-teaching nexus given in figure 5 (see page 37). Thus, I may conclude that the research-teaching nexus in the EELC and CELC is very low due to predominance of lectures, written and/or oral tests/examinations in both courses.

The third question of this study was "What are teaching practices used by the teaching staff to link research and teaching in the EELC of the Faculty of Education and CELC of the Faculty of Engineering at UEM?" In relation to the third question of the study, the key findings achieved by the classroom observations indicate that the teaching practices are more concerned with the lecturer-focused method rather than the student-focused method in both EELC and CELC. For example, table 32 (see page 128) and table 33 (see page 130) demonstrate that students listen to their lecturers' presentations and take notes. This means that in the EELC and CELC the role of lecturers is to transmit information or knowledge through lectures while the role of the students is to memorise and reproduce the information or knowledge transmitted by the lecturer. In this case, the use of lectures as a way of transmitting knowledge is a major indicator of the research-led curriculum outline in figure 5 (see page 37). Therefore, I may conclude that the integration of research and teaching through teaching practices is very low in both EELC and CELC according to the scale of the research-teaching nexus given in figure 5. The next section is concerned with the general conclusion of the study.

6.1.3 General conclusion of the study

The dimensions of the concept of the research-teaching nexus (research-based, research-tutored, research-oriented and research-led) that have been used to explore the nexus of research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM have been shown to be useful for measuring the dimensions of the concept of the research-teaching nexus mentioned previously. However, the findings generated by this study reveal that the EELC and CELC predominantly use a research-led curriculum in which the main indicators comprise learning about others' research, lectures and traditional written tests and examinations outlined in figure 5 (see page 37). Furthermore, the research-led

curriculum is associated with the lecturer-focused method (information transmission) in which the lecturer plays an active role of knowledge transmitter through lectures and students play a passive role of knowledge recipient leading to a surface or a strategic approach to learning. On the basis of the findings of this study, it is concluded that the integration of research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM is very low according to the indicators and the analytical framework of the research-teaching nexus outlined in figure 5 (see page 37) and figure 6 (see page 39) respectively. Meanwhile, it is proposed that future research should concentrate on the research-teaching nexus in Mozambican higher education curricula and motivation of the lecturers and students in order to link research and teaching in higher education. The next section is concerned with the implication of the study for practice.

6.1.4 Implications of the key findings of the study for practice

According to the analytical framework outlined in figure 6 (see page 39), the curriculum designs that may develop the nexus of research and teaching in higher education are research-based and research-tutored ordered very high and high respectively (see figure 5 on page 37). These curricula underlie the student-focused method in which the students learn through constructivist perspectives rather than behaviourist perspectives. In the student-focused method, the students are active participants and use scholarship for knowledge construction leading to deep approach to learning as a way of integrating research and teaching in higher education. Nevertheless, the key findings from this study indicate that the integration of research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM is based on research-led curriculum ordered very low (see figure 5). This means that the research-led curriculum underlies the teacher-focused method consisting of behaviourist perspectives to teaching and learning with absence of scholarship resulting in surface or strategic approaches to learning as a way of integrating teaching and research in higher education. This way of integrating research and teaching suggests that the EELC and CELC are more involved in teaching rather than research throughout their courses. Thus, this study has contributed to the understanding of the state of the research-teaching nexus in the

EELC and CELC at UEM, yet the study has found that the state of research-teaching nexus is very low in both courses due to the employment of the research-led curriculum comprising lectures and tests or examinations in the process of teaching and learning aligned with the teacher-focused method resulting in surface approach to learning leading to the integration of research and teaching very weak. Nonetheless, this can be overcome by employing the research-based and research-tutored curricula. These curricula consist of research-based activities such as research projects as well as writing and discussion of essays or papers aligned with the student-focused method in which the teaching-learning process is centred on the student resulting in deep learning and the use of scholarship as a way of linking research and teaching in higher education effectively. Thus, this study can raise awareness on curricula and teaching practices as well as teaching methods and learning approached that may enhance the integration of teaching and research in higher education. At the same time, the study may influence the change from a very low scale to a very high scale of the research-teaching nexus at UEM as a consequence of the revelation of the data and insights of the study. The next section is related to the limitation of the study.

6.1.5 Limitations of the study

Despite this study has been attentively conducted, it has four limitations. The first limitation of this study was that it was only conducted in two courses specifically the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM in the fields of education and engineering involving soft discipline and hard disciplines respectively. In this case, the findings of the study may be transferrable to other courses from the faculties under studied at UEM or other faculties at UEM or other Mozambican higher education institutions entailing soft applied disciplines and hard applied disciplines. Meanwhile, to overcome this limitation future research should cover more higher education institutions in Mozambique and more courses from different faculties involving soft and pure disciplines, soft and applied disciplines, hard and pure disciplines as well as hard and applied disciplines.

The second limitation of the study was that the quantitative questionnaires involved a small sample of the respondents because of financial constraints to devise the questionnaires with a larger sample. For this reason, the results from the quantitative

questionnaires were not representative for the whole population of the students and lecturers in the Faculty of Education and the Faculty of Engineering at UEM. However, the quantitative results from the quantitative questionnaires were still reliable and were used to assist the interpretation of qualitative findings of the study. This means that the study placed weight on qualitative findings as it wanted to understand the link between research and teaching in the EELC of the Faculty of Education and the CELC of the Faculty of Engineering at UEM from the experiences, beliefs and points of view of the research participants.

The third limitation of the study was concerned with the lack of further relevant questions that should have been included in the interview and the questionnaire as the research methods. For example, the questions about the age and the gender of the students in order to understand how these factors can influence the development of the research-teaching nexus in higher education. Likewise, the research methods should have asked lecturers the questions related to their training courses for teaching and research in higher education or pedagogical research experiences on curriculum designs and teaching practices. At the same time, the research methods should have enquired about lecturers and students' academic freedom, motivation, financial or moral support that the lecturers and students have in order to link research and teaching in higher education. Thus, future research should include the questions mentioned earlier in attempt to understand how a training course for teaching and research in higher education or pedagogical research experiences, academic freedom as well as motivation, and financial or moral support can influence the link between research and teaching in higher education.

The last limitation of the study is that so far, however, there has been little discussion on the guidance for integrating research and teaching in higher education through research-based, research-tutored, research-oriented and research-led curriculum and their teaching practices. In addition, little attention has been paid to the time balance of integrating research and teaching through the four curriculum designs mentioned previously when they are employed simultaneously in the process of teaching and learning. Notwithstanding, in this study, the balance of integrating research and teaching through the four curriculum designs mentioned earlier was based on the

predominance of teaching activities undertaken in each of the curriculum as well as teaching methods. Altogether, I suggest that future research should be conducted on the guidance and time balance of integrating research and teaching in higher education. The next section provides recommendations of the study.

6.1.6 Recommendations of the study

In order to develop the nexus of research and teaching effectively in higher education I offer recommendations as follows:

- Lecturers should have pre-service or in-service course training on how to design and use specific curricula such as research-based, research-tutored, research-oriented or research-led and their respective teaching methods, activities and learning approaches as well as assessment in order to integrate teaching and research in higher education.

- Lecturers should have pre-service or in-service course training on how to design and use research-based, research-tutored, research-oriented or research-led and their respective teaching methods, activities and learning approaches as well as assessment in order to integrate research and teaching in higher education in an eclectic way.

- Seminars or conferences on the research-teaching nexus and scholarship (scholarship of discovery, scholarship of integration, scholarship of application and scholarship of teaching and learning) should be regularly conducted in the course, department, faculty or institutional level.

- Lecturers should be evaluated on their research output including pedagogical research.

- Research should be conducted on lecturers and students' academic freedom in order to integrate research and teaching in higher education.

- Research should be undertaken on lecturers and students' motivation in order to integrate teaching and research in higher education.

- Research should be conducted on the kind of support that the department, faculty or institution should give to lecturers and students in order to integrate research and teaching in higher education throughout their courses.

- Research should be conducted on general guidance of designing and using research-based, research-tutored, research-oriented or research-led and their respective teaching methods, learning approaches and assessment in order to integrate research and teaching in higher education.

- Research should be conducted on general guidance of the research-teaching nexus evaluation framework.

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Appendix A: Interview for students about research teaching linkages in the EELC of the Faculty of Education-UEM

I am a master student from Higher Education Studies and Development Course in the Faculty of Education at UEM and I am working on my dissertation project. The topic of the dissertation project is entitled 'The Research-teaching nexus in Mozambican Higher Education Curricula', the case study of UEM. I have designed this interview for licenciatura students in the Environmental Education Course of the Faculty of Education at UEM. The purpose of this interview is to understand your experiences concerning with teaching and research integration throughout your undergraduate licenciatura course. The interview is divided into four main items with their respective questions aimed to understand the learning activities, patterns of interactions and assessments that students have during their licenciatura course in attempt to link teaching and research. At the same time, the interview is concerned with how you feel or think about the integration of research and teaching in your licenciatura course. The interview will take approximately 40 minutes. Your answers will help us to analyse the effectiveness of curriculum designs and teaching practices used by the teaching staff in your field to link research and teaching in higher education. Your responses will be kept strictly confidential and the results will be used for research purpose only.

Interview guide

1. **Engagement of students in authentic research (research-based curriculum)**

a) Have you done any individual or group research projects during your licenciatura course? If yes, please describe some of the projects that you have done.

b) Do you have any experience of conducting an interview in the field? If yes, would you please inform what the field interview was about?

c) Do you have any experience of conducting observation in the field? If yes, would you please inform what the field observation was about?

d) Have your lecturer asked you to assist his or her research project. If yes, what assistance did you provide for your lecturer's research projects?

e) Do you have any experience of collecting or analysing data for your lecturers' research in your course, department or faculty? If yes, would you inform what the data were about?

f) Do your lecturers ask you to write or present research projects as assessment activities during your course? If yes, what are the criteria for the assessment?

g) Do your lecturers ask you to conduct interview or observation in the field as assessment activities during your course? If yes, what are the criteria for the assessment?

2. Involvement of students in discussion or analysis of academic essays or papers (research-tutored curriculum)

a) Do you write academic essays or papers? If yes, would you please provide examples of topics you write about?

b) Have your lecturers provided you compulsory bibliography in order to read and write academic essays or papers? If yes, would you please inform whether the compulsory bibliography is concerned with your area of the study only or other areas?

c) Do your lecturers recommend you to read some literature in order to produce academic essays or papers? If yes, would you please inform whether the recommended bibliography is related to your area of the study only or other areas?

d) Have you been assigned writing topics with a tutor (a supervisor) from your course or outside your course? If yes, how often do you meet your tutor in a week or month for tutorial (supervision) of essay or paper writing?

e) Do you present academic essays or papers for class discussion during lectures? If yes, would you inform how the presentation and discussion are done?

f) Do you do critical analysis of your partner's academic essays or papers as tutorial (supervision) assignment? If yes, would you inform how the tutorial is done?

g) Do your lecturers demand you to do literature review and critique? If yes, what do you think it is the importance of literature review and critique according to your experience?

h) Are you assessed on writing of academic essays or papers during or at the end of your course? If yes, what are the criteria of the assessment?

i) Are you assessed on oral presentations of academic essays or papers during or at the end of your course? If yes, what are the criteria of the assessment?

j) Are you assessed on literature review and critique throughout your course? If yes, could you give examples of what your lecturers would like you to master on literature review and critique?

3. Knowledge construction in the discipline (research-oriented curriculum)

a) Do your lecturers provide scenarios or situations of real life problems for students to discuss and find possible solutions during lectures? If yes, would you please inform how the discussion of real life problems in your course is organised?

b) Do your lecturers formulate questions or hypotheses for students to find possible answers or explanation? If yes, would you please give examples of questions or hypotheses that your lecturers have formulated for students?

c) Are you assessed on problem solving during or at the end of a semester? If yes, would you please inform how the assessment is done?

d) Are you assessed on answering questions or hypotheses during or at the end of a semester? If yes, would you please inform how the assessment is done?

4. Learning about others' research (research-led curriculum)

a) Do you analyse research methodologies or research findings of the studies already conducted in your area of the study? If yes, what do you usually analyse in methodologies or research findings?

b) Do your lecturers present current research in your area of the study during lectures? If yes, would you please provide examples of the current research that your lecturers have presented during lectures?

c) Do your lecturers use dissertations or theses that have already been produced as models for students to learn how to do research? If yes, how do you feel about using dissertations or theses that have already been produced as models for learning how to do research?

d) Would you please mention the type of tests or examinations you have done during or at the end of a semester?

e) Would you please mention the assignments you have done during or at the end of a semester?

f) According to your experiences throughout your undergraduate licenciatura course, do you think that students in your course do research? Why/why not?

Thank you for your time!

Table 2: Discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the EELC of the Faculty of Education-UEM

Variable 1: Research-based
I have done individual and group research projects during my course. For example, I have conducted research projects in the discipline of Educational Research Methods and I have conducted a research project about environmental education at Guazamuthini Secondary School in Marracuene, Maputo. Out of my course, I have conducted a research project of the Faculty of Education in coordination with a non-government organisation about why girls drop out of schools in Inhambane [province]. Likewise, I have conducted a research project about pollution of rivers due to the use of mercury to extract gold in Manica province. In this project, I designed instructions for river pollution solution. In the scope of the fieldwork activities held in our course, I have conducted fieldwork interviews and observations in the environmental area on Ilha de Inhaca and the objective of this fieldwork was to interview the community about socio-environmental issues. In this case, we conducted fieldwork interviews about the relationship between society and environment. Also, I have conducted fieldwork interviews about solid waste in resources centres at UEM. Furthermore, out of my course, I have done fieldwork interviews about consumer satisfaction with improved cooking stoves in Maputo in the research project of the Faculty of Education with a non-government organisation. In addition, I have done fieldwork observations and interviews about deforestation in Matutuine, Maputo province. Similarly, I have done fieldwork observations and interviews about environmental problems in the community of the Limpopo National Park in Gaza province and I have done an interview about an educational project at Guazamuthini Secondary School in Marracuene, Maputo province. One of the lecturers from the Faculty of Education in my department requested two students in which I was one of them to be selected in order to assist a project of non-government organisation about the consumer satisfaction with improved cooking stoves in Maputo and in this project we administered questionnaires. Besides, I have collected and analised data after interviews and observations that we have conducted

as fieldwork activities and I have analised data individually and in groups for an environmental project undertaken on Ilha de Inhaca.

I believe that students from my course do research since on the 7 June, the day of environment some students have done presentations on the topics about environmental problems for discussion in order to find out possible solutions. Moreover, I can say that students in my course conduct research according to a survey done by one of our lecturers in which he concluded that many students prefer to write monographs rather than internship reports. Even though students have conducted research throughout their course, it is the poor quality due to the lack of a critical view and supervision. In this case, I think that lecturers should give more priority to critical research because students read and reproduce knowledge. This means that we have limitation on how to do research. In spite of having the discipline of Research Methods, I think it is not enough. In this context, I suggest that we should have a discipline of Monograph in year 3 and year 4 so this discipline could reinforce the discipline of research methods as this discipline aims to introduce how to do research. Moreover, the discipline of Monograph could help students conduct actual research instead of talking about research. In this case, the discipline of Monograph could help students develop deep knowledge through research and, in turn, this could help students develop their capstone projects (the end of licenciatura course projects) with more deep knowledge in different stages of research such as data collection, analyse and interpretation of data.

Variable 2: Research-tutored

I have written essays, for example, I have written an essay about the system of environmental management in the Mac Mahon (2M) company and I have written an essay about environmental sustainability and the common topics of essays are related to climate changes, global warming and pollution in general.

At the beginning of a semester, lecturers provide students an analytic plan with bibliography related to discipline in order to write essays, even so, students should research complementary bibliography. Sometimes, depending on the discipline, the lecturer can recommend bibliography of discipline that is being lectured and other

related discipline in the area of environmental education. In this case, some lecturers recommend literature such as scientific journals to develop a specific essay although there is less recommendation of bibliography since the students are encouraged to look for bibliography by themselves during teaching-learning process.

I have presented essays for discussion in the class and I have been assigned the topics of presentation by the lecturer or I have chosen my own presentation topics. Thus, during the course, we write many essays and reports in some disciplines. For example, when we went to the fieldwork in the Limpopo National Park, we were assigned some topics to develop in the field and after few days we presented our assignments to the class and lecturers that were monitoring us. We usually do the presentations in seminars and we sit in different ways such in a round table, in groups or individually. However, the recurrent way of sitting during presentation is individual one while the group or a person presenting stays before the class to do the presentation. Meanwhile, after the presentation, there is a cycle time critical discussion about the presentation as well as contributions. Despite lecturers appeal for suggestions about any topic that has been presented, often, students leave contributions to make questions to see whether the presenter is competent with the topic or not. In this context, students probably want to reinforce the final assessment the lecturer will give to their fellow student who presented since assessment is the basis in the academy. At last, the lecturer closes the discussion and gives the benchmarks and the summary of the presentation in the sense that we should not be lost. Nonetheless, the organisation of the discussion for presentation depends on the lecturer. In this case, some lecturers, after presentation, ask questions to the group or individual who presented and facilitate the discussion and, at the end, the lecturer makes some general comments. By contrast, other lecturers select one of the students in the class as a facilitator of the presentation and discussion. In this way, these lecturers involve students in a constructive, participative, reflective and critical discussion. For instance, there was a lecturer who used to employ the constructivist, participative, reflective and critical teaching methods. Thus, he organised students in pairs or groups in order to promote a more productive discussion.

In the critical literature review, we should know the strengths and weaknesses of the

authors, therefore, this demands students to read and have practical understanding of what he or she has read. In this context, critical literature review makes us more academic because an academic is an individual who analyses, criticises and look at the concept and topic in different perspectives as well as the vision of the author regarding to theoretical and practical reality.

In the discipline of Philosophy of Education we have done critical review of the work of three authors in which we criticised their approaches about environmental issues that exist in society since the idea of higher education is to train people who think different types of approaches for better intervention in society.

I have done many written assignments, literature review and research assignments in the discipline of Educational Research Methods as well as reports since in some disciplines we have to do some assignments in the communities in order to understand their environmental behaviour and help them be aware of it. After that, we do field report which is assessed qualitatively. Similarly, the lecturer assesses students on discussion and application of concepts in written and oral form. In this case, the lecturers assess the factors and impacts of the concepts. Thus, we must be able to discuss the concepts in written and oral form and the lecturer assesses these activities. Nonetheless, the final assessment of the oral presentation consists of the presentation and defence of the work and this usually occur in year 4.

Sometimes, the assessment of literature critique is done through the participation of students during discussion of assignments in which some lecturers give quantitative assessment for the participation of the student during lecturers. In this way, the quantitative assessment has created motivation for students to participate in the construction of knowledge

Variable 3: Research-oriented

The lecturers have created scenarios of real life problems in the area of the study for students to discuss and the topics are related to different environmental problems in Mozambique. Nevertheless, the creation of scenarios for discussion depends on the discipline, yet some specific lecturers bring these kinds of scenarios for discussion

mainly in the discipline of Didactics of Materials as well as Natural Sciences and Environmental impacts. For example, we had simulation in the subject of Natural Sciences and Environmental Impacts concerning with the situation of some negative environmental practices in the community for students to discuss. In this case, the main purpose of this activity was to bring new information to the citizen about positive environmental practices. During this activity, in the discipline of Environmental Impacts we were divided into groups and we were given some worksheets with a scenario about the assessment of the environmental impact to discuss possible steps to take for mitigation of the situation. We usually discuss the topics in groups or in a round table and sometimes we discuss the topics individually. The lecturers assess students on solving real problems, for example in the discipline of Didactics of Materials.

Variable 4: Research-led

We are more concerned with literature, different approaches from the authors about an issue and conclusion that they have reached about the work. At the same time, we analyse the research methods and we focus more on the organisation of the assignment and central idea of the topic. We have analysed research instruments in the discipline of Environmental Impacts in year 4 even though it is not frequent. In addition, we analyse the strengths and weaknesses of the legislation about the evaluation of environmental impacts. In this context, the lecturer gives us an article to read and identify its strengths and weaknesses or the lecturer gives the general idea of what student should extract from the article. Nevertheless, we focus more on the content, that is, the main ideas of the article and conclusion of the author.

My feeling about the lecturers who use dissertations or theses already produced as a model for students to conduct research is that lecturers should give us a direction how to do research and I think this sometimes helps because you cannot reach an unknown place easily if you do not have a map for orientation. However, I do not know whether it is laziness or students like easy things because they use the model to do copy paste (reproduce) the information for their assignments while they should look for the procedures of the model provided to see how the research is done, how to

analyse data and what is the direction to follow in research. In spite of some students using copy paste of information provided as a model to do research, other students benefit from the model to do their research.

Apendice B: Entrevistas para estudantes sobre a ligação do ensino e a pesquisa no Curso de Educação Ambiental da Faculdade de Educação-UEM

Sou estudante do Curso de Mestrado em Estudos do Ensino Superior e Desenvolvimento na Faculdade de Educação-UEM e estou a desenvolver um projecto de dissertação do tema intitulado "A Integração do Ensino e a Pesquisa nos Currícula do Ensino Superior", o Estudo de Caso da UEM. Esta entrevista destina-se para estudantes de licenciatura do Curso de Educação Ambiental da Faculdade de Educação na UEM. O propósito desta entrevista é de conhecer as suas experiências relativas a integração do ensino e a pesquisa ao longo do seu curso de licenciatura. A entrevista está dividida em quatro questões principais com as suas respectivas perguntas que têm como ojectivo de conhecer os tipos de actividades de aprendizagem, formas de interação e tipos de avaliação que os estudantes realizam durante o processo de ensino e aprendizagem com vista a integrar o ensino e a pesquisa no ensino superior. Igualmente, a entrevista tem como objectivo de perceber como é que sente ou pensa sobre a integração do ensino e a pesquisa no seu curso. A entrevista terá a duração de aproximadamente 40 minutos. As suas respostas vão ajudar-nos analisar os tipos de currícula, métodos e práticas de ensino que os docentes usam para integrar o ensino e a pesquisa no ensino superior. Porém, as suas respostas serão mantidas confidenciais e os resultados serão usados para os fins de pesquisa somente.

Guião de entrevista

1. **Envolvimento de estudantes em pesquisas originais (curriculo-baseado em pesquisas)**

a) Tem realizado projectos de pesquisa individuais ou em grupos ao longo do seu curso de licenciatura? Em caso afirmativo, por favor descreva os projectos de pesquisa que já realizou.

b) Tem realizado entrevistas como trabalho de campo para projectos de pesquisa ao longo do seu curso? Em caso afirmativo, por favor dê exemplos de entrevistas que já realizou como trabalho de campo.

c) Tem realizado observações como trabalho de campo para projectos de pesquisa durante o seu curso? Em caso afirmativo, por favor dê exemplos de

observações de campo que já realizou durante o seu curso.

d) Tem sido solictado pelos seus docentes para dar assistência na realização dos seus projectos de pesquisa ao nível do seu curso, departamento ou faculdade? Em caso afirmativo, por favor informe a assistência que já deu para os projectos de pesquisa dos seus docentes.
e) Tem alguma experiência de colectar ou analisar dados para projectos de pesquisa dos seus docentes ao nível do curso, departamento/faculdade? Em caso afirmativo, por favor dê exemplos de dados que ja colectou ou analisou?
f) Tem escrito ou apresentado projectos de pesquisa como actividade de avaliação durante o seu curso? Em caso afirmativo, quais foram os critérios usados para avaliação de projectos que já escreveu ou apresentou?
g) Tem realizado entrevistas ou observações de campo como actividades de avaliação durante o seu curso? Em caso afirmativo, quais foram os critérios usados para avaliação das entrevistas ou observações que já realizou?

2. Envolvimento de estudantes na discussão ou análise de ensaios académicos (currículo baseado em discussões sobre pesquisa)

a) Tem escrito ensaios académicos? Em caso afirmativo, Por favor dê exemplos de temas que tem escrito.
b) Os seus docentes têm lhe fornecido uma bibliografia obrigatória afim de ler e elaborar ensaios académicos? Em caso afirmativo, poderia informar se a bibliografia obrigatória fornecida pelos docentes é sobre a sua área de estudo somente ou outras áreas.
c) Os seus docentes têm lhe recomendado literatura para ler afim de produzir ensaios académicos? Em caso afirmativo, poderia informar se a literatura recomendada é relacionada com a sua área de especialidade ou outras áreas.
d) Ao longo do seu curso, tem tido temas para escrever sobre a assistência do seu docente como tutor (supervisor) dentro do seu curso ou sobre assistência doutros docentes como tutores dentro ou fora do seu curso? Em caso afirmativo, quantas vezes por semana ou mês encontra-se com o seu tutor para supervisão de ensaios académicos?
e) Tem apresentado trabalhos académicos tais como ensaios para discussão na

sala de aulas? Em caso afirmativo, por favor informe como é que apresentação e discussão são feitas?

f) Tem tutorado (supervisionado) trabalhos académicos (e.g. ensaios) doutros estudantes? Em caso afirmativo, por favor informe como é que a tutoria (supervisão) é feita.

g) Os seus docentes exigem-lhe fazer a revisão crítica da literatura? Em caso afirmativo, qual é a importância da revisão crítica da literatura segundo a sua experiência?

h) Os seus docentes têm dado avaliação sobre a escrita de ensaios académicos durante ou no final do semester? Em caso afirmativo, quais são os critérios de avaliação?

i) Os seus docentes têm dado avaliação sobre a apresentação oral de ensaios académicos durante ou no final do semester? Em caso afirmativo, quais são os critérios usados para avaliação de apresentação oral de ensaios académicos?

j) Os seus docentes têm dado avaliação sobre a revisão crítica da literatura? Em caso afirmativo, por favor dê exemplos dos aspectos que os seus docentes gostariam que os estudantes dominassem em relação à revisão crítica da literatura.

3. Construção de conhecimento na disciplina (currículo com orientação da pesquisa)

a) Os seus docentes têm criados cenários ou situações sobre problemas da vida real na sua especialidade para os estudantes discutirem? Em caso afirmativo, por favor informe como é que é a discussão de problemas da vida real na sua especialidade é organizada na sala de aulas?

b) Os seus docentes têm formulados perguntas de pesquisa ou hipóteses para os estudantes realizarem pesquisa? Em caso afirmativo, por favor dê exemplos de perguntas ou hipóteses que os docentes têm formulados para os estudantes realizarem pesquisa?

c) É avaliado em resolução de problemas na sua especialidade durante ou no final do semestre? Em caso afirmativo, por favor informe como é que a avaliação em resolução de problemas na sua especialidade é feita?

d) Os seus docentes têm formulado perguntas de pesquisa ou hipóteses para os

estudantes darem possíveis respostas ou explicação como forma de avaliação durante ou no final de semestre? Em caso afirmativo, por favor informe como é que a avaliação é feita?

4. Aprendizagem sobre pesquisas feitas por outros (currículo da pesquisa direcionada)

a) Tem analisado metodologias de investigação ou conclusões de estudos já feitos ao nível da disciplina? Em caso afirmativo o que tem analisado nas metodologias de investigação ou conclusões dos estudos já realizados?
b) Os seus docentes têm dado apresentações sobre pesquisas recentes dentro da disciplina durante as aulas? Em caso afimativo, por favor dê exemplos de pesquisas recentes que os seus docentes já apresentaram durante as aulas?
c) Os seus docentes têm usado dissertações ou teses já produzidas como modelos para estudantes fazerem pesquisa? Em caso afirmativo, qual é o seu sentimento sobre o uso de dissertações ou teses já produzidas como modelos para estudantes aprenderem como fazer pesquisa?
d) Por favor mencione o tipo de testes ou exames que tem realizado durante ou no final do semestre.
e) Por favor mencione trabalhos académicos que tem realizado como forma de avaliação durante ou no final do curso.
f) Segundo as suas experiências ao longo do seu curso de licenciatura, acha que os estudantes do seu curso fazem pesquisa? Porquê/porquê não?

Muito obrigado pelo seu tempo dispensado!

Appendix C: Interview for students about research and teaching linkages in the CELC of the Faculty of Engineering-UEM

I am a master student from Higher Education Studies and Development Course in the Faculty of Education at UEM and I am working on my dissertation project. The topic of the dissertation project is entitled 'Research-teaching nexus in Mozambican Higher Education Curricula', the case study of UEM. I have designed this interview for licenciatura students in the Civil Engineering Course of the Faculty of Engineering at UEM. The purpose of this interview is to understand your experiences concerning with teaching and research integration throughout your licenciatura course. The interview is divided into four main items with their respective questions aimed to understand the learning activities, patterns of interactions and assessments that students have during their licenciatura course in attempt to link teaching and research. At the same time, the interview is concerned with how you feel or think about the integration of research and teaching in your licenciatura course. The interview will take approximately 40 minutes. Your answers will help us to analyse the effectiveness of curriculum designs and teaching practices used by the teaching staff in your field to link research and teaching in higher education. Your responses will be kept strictly confidential and the results will be used for research purpose only.

Interview guide

1. **Engagement of students in authentic research (research-based curriculum)**

a) Have you done any individual or group research projects during your licenciatura course? If yes, please describe some of the projects that you have done.

b) Do you have any experience of conducting an interview in the field? If yes, would you please inform what the field interview was about?

c) Do you have any experience of conducting observation in the field? If yes, would you please inform what the field observation was about?

Have your lecturer asked you to assist his or her research project. If yes, what assistance did you provide for your lecturer's research projects?

d) Do you have any experience of collecting or analysing data for your lecturers'

research in your course, department or faculty? If yes, would you inform what the data were about?

e) Do your lecturers ask you to write or present research projects as assessment activities during your course? If yes, what are the criteria for the assessment?

f) Do your lecturers ask you to conduct interview or observation in the field as assessment activities during your course? If yes, what are the criteria for the assessment?

2. Involvement of students in discussion or analysis of academic essays or papers (research-tutored curriculum)

a) Do you write academic essays or papers? If yes, would you please provide examples of topics you write about?

b) Have your lecturers provided you compulsory bibliography in order to read and write academic essays or papers? If yes, would you please inform whether the compulsory bibliography is concerned with your area of the study only or other areas?

c) Do your lecturers recommend you to read some literature in order to produce academic essays or papers? If yes, would you please inform whether the recommended bibliography is related to your area of the study only or other areas?

d) Have you been assigned writing topics with a tutor (a supervisor) from your course or outside your course? If yes, how often do you meet your tutor in a week or month for tutorial (supervision) of essay or paper writing?

e) Do you present academic essays or papers for class discussion during lectures? If yes, would you inform how the presentation and discussion are done?

f) Do you do critical analysis of your partner's academic essays or papers as tutorial (supervision) assignment? If yes, would you inform how the tutorial is done?

g) Do your lecturers demand you to do literature review and critique? If yes, what do you think it is the importance of literature review and critique according to your experience?

h) Are you assessed on writing of academic essays or papers during or at the end

of your course? If yes, what are the criteria of the assessment?

i) Are you assessed on oral presentations of academic essays or papers during or at the end of your course? If yes, what are the criteria of the assessment?

j) Are you assessed on literature review and critique throughout your course? If yes, could you give examples of what your lecturers would like you to master on literature review and critique?

3. Knowledge construction in the discipline (research-oriented curriculum)

a) Do your lecturers provide scenarios or situations of real life problems for students to discuss and find possible solutions during lectures? If yes, would you please inform how the discussion of real life problems is organized in class?

b) Do your lecturers formulate questions or hypotheses for students to find possible answers or explanation? If yes, would you please give examples of questions or hypotheses that your lecturers have formulated for students?

c) Are you assessed on problem solving in your area of the study during or at the end of a semester? If yes, would you please inform how the assessment is done?

d) Are you assessed on answering questions or hypotheses during or at the end of a semester? If yes, would you please inform how the assessment is done?

4. Learning about others' research (research-led curriculum)

a) Do you analyse research methodologies or research findings of the studies already conducted in your area of the study? If yes, what do you usually analyse in methodologies or research findings?

b) Do your lecturers present current research in your area of the study during lectures? If yes, would you please provide examples of the current research that your lecturers have presented during lectures?

c) Do your lecturers use dissertations or theses that have already been produced as models for students to learn how to do research? If yes, how do you feel about using dissertations or theses that have already been produced as models for doing research?

d) Would you please mention the type of tests or examinations you have done during or at the end of a semester?

e) Would you please mention the assignments you have done during or at the end of a semester?

f) According to your experiences throughout your undergraduate licenciatura course, do you think that students in your course do research? Why/why not?

Thank you for your time!

Table 3: Discourse of the collective subject from the semi-structured qualitative interview with year 4 students in the CELC of the Faculty of Engineering-UEM

Variable 1: Research-based
We have conducted research projects in groups and individually and this kind of activities require the class to be divided into groups in order to develop research. For example, in the discipline of environmental impacts and security we have conducted a research project in groups about the study of environmental impacts for transferring the market called Mercado de Peixe in Maputo City to another location in the city. Meanwhile, in other disciplines, we have undertaken research projects such as water supply in Monapo Village last year [2015]. Also, we have done projects such as cost assessment projects for construction of a building and a bridge as well as measurement of a hangar. We are about to start a building installation project and we going to develop a project that will consist of measuring a building and its system of water drainage and sanitation. However, we have not specifically developed research projects, yet we have some assignments to consolidate the knowledge taught during lectures not necessarily research projects. For example, the lecturers teach us how to calculate the structure of a construction work in the classroom. Then the lecturers give us a project or a floor plan to design and after that we calculate the project or construction costs. At the beginning of the discipline of Introduction to Engineering, we have been assigned fieldwork for those who had topics related to society such as urbanisation. In this context, we had a topic about water piping system and then we went to a community called Bairro de Mafala to have interviews with the residents of this community in order to understand how they deal with their water piping system. Furthermore, one of the projects that made us conduct some interviews was the project about transferring Mercado de Peixe. As this project was developed out of the faculty we had to go and see things in the field. Nonetheless, in many projects that we have been assigned do not require interviews for their development. That is to say, there are assignments which are concerned with consolidation of what we learn in the classroom, but we can for example have a project of hydraulic works in which it needs data such as discharge or outflow of a river in the case of construction of a dam

or a bridge. In this context, it is necessary to know the data and characteristics of the flowing capacity of the river so we go to National Institute of Statistics, National Directorate of Water or internet to search the data for the project mentioned earlier. Nevertheless, if it is a project about water supplying and we need the data for example the number of population who lives in a location, we search the data in Institute of Statistics. Meanwhile, in some disciplines such as Communication Networks there are situations in which we have to move to any junction in order to count the number of vehicles that drive in the junction and on the basis of this number we calculate the demand of the junction and its measurements.

You are asking many questions which involve research, but we are not devoted to research as such in this faculty instead we have some assignments in which we read some books or we go to internet to do some brief investigation in order to write a certain assignment and submit to the lecturer for assessment. Notwithstanding, I have written and presented research projects at the level of the discipline for my class attendance grade. In this case, we have presented the project and after the presentation the lecturer asks some questions and then provides the grade. For instance, we have conducted a project about water supply to Monapo Village last semester [2015] and this project was assessed quantitatively. Also, in this semester, we have had a project at the level of the discipline about a wall measurement in police Academy. Then we submitted the project to the lecturer and we were assessed quantitatively.

Variable 2: Research-tutored

Some assignments that we have done are small projects in the discipline. For example, we had an assignment last semester to measure a beam. Thus, we have done assignments to give answer to some issues.

Usually, in some disciplines after doing laboratory essays, we have to write a report and present it, all the same the essays are discussed at the level of the discipline in the following way:

First, we present the essay in the classroom about its importance. Next, we conduct

the essays in the laboratory. Finally, we present the results through a report as an assessment activity.

At the beginning of the semester, some lecturers recommend some bibliography in which we can find the necessary information to do the subject and acquire the basic knowledge of the discipline. In this context, the lecturers provide the main and the secondary bibliography such as manuals, books and others, yet some bibliography supplied by the lecturers can be found in the faculty library, but other bibliography belongs to the lecturers since the faculty library does not have it. In addition, the lecturers recommend some manuals that have been used by some designers or advise students to research bibliography by themselves. Moreover, the lecturers suggest bibliography that can help students to master the knowledge of the discipline or rather to understand issues of the discipline.

We have had topics to write under the assistance of the lecturers in the project of the discipline and the end of the course project in year 4 although it is rare. In this case, in the project of the discipline, the lecturer gives topic to students and they develop their projects under assistance of the lecturer in the discipline. Whereas, in the end of the course project, the lecturer gives students topics to develop and respective lecturers in the related areas of the topics to assist the students' projects. For example, in the end of the course projects of hydraulic works and structures of metals, the lecturers specialised in these areas are the ones that give us assistance for project development. In both projects of the discipline and the end of the course project, the lecturers are available to give students assistance whenever the students need. That is, the lecturers give us assistance and they are open to meet with students for tutoring. Nonetheless, this depends on the need of the students and I believe that if you do not have any doubt, it means that everything is okay. In other words, the meeting between students and lecturers occurs according to difficult that the student has with his or her work even though the student sometimes does not know whether he/she is in a good track or not. Some of the project assignments we present to the whole class, but others we present to the lecturer and then we discuss with him. In this context, there are individual project assignments as well as group project assignments. In the former, the student presents his/her assignment before the class and after presentation the

class and the lecturer ask questions and give comments while in the latter, each group presents its work before the class and after presentation, the class asks questions and gives some comments. At last, the lecturer also asks questions and gives observations to every single member of the group that presented. In this case, when a member of the group answers a question, the lecturer assesses him/her. Despite the presentation being in groups, the grade is individual and it is according to the performance of individual member of the group during the presentation and defence. During individual or group presentation, the students sit individually in the classroom.

I have done literature review and critique, but one of the things that I have noted is that sometimes we read and write everything we find and we consider it as absolutely right since we do not have ability to analyse and criticise what is written as well as the reliability of the source. Notwithstanding, the lecturer has demonstrated A and B that this is according to what you have actually found, but it should be like this.

I think that the lecturers should not demand critical literature review as such, but they should develop appropriate activities that may help students to analyse the literature deeply and criticise it. Although lecturers teach us how to obtain relevant information and criticise it through the discipline of Introduction to Engineering in which the lecturer gives tools how to study, how to research and others.

On account of everything being internet, one of the things that the lecturers always give us attention is that we should not accurately follow everything we find in the internet so we must be critical, but we need a basis to do this. Furthermore, we have to look for information from a variety of authors and we should always use recommended bibliography because it has been assessed. For instance, some sites of internet which have some reliable articles. In short, the lecturers advise us that we should assess, analyse and criticise the literature and they do assessment on these activities.

Even though the lecturers rarely give topics at the beginning of the semester to develop throughout the semester, last year [2014] one lecturer gave us a topic at the beginning of the semester in order to develop an assignment as a test. Then we

developed the assignment tutored by the lecturer during the semester and in about every fortnight we discussed the project with the lecturer or we sometimes discussed with the class. At the end of the semester, we submitted our assignments to the lecturer for final assessment and grading.

Variable 3: Research-oriented

Some lecturers bring situations or scenarios about real life problems in civil engineering. For example, the lecturers present a situation about a landslide in place x or damage of a road and possible causes and we discuss possible solutions to avoid this type of situation. For instance, in the discipline of concrete structures we have been challenged with real situations for difficult problems of development in the field of civil engineering as well as possible causes of building pathologies in Maputo City. Whereas, in the discipline of Soil Mechanics we investigate possible solutions and parameters that we need to determine the structures to be installed. This semester, we did an assignment in groups that aimed to investigate the road network. In this case, each group had to investigate one of the layers of a road. Then each group presented its assignment before the class and after that, the class discussed the presentation of the group. Finally, the lecturers provided their comments. Although the purpose of this assignment was to discuss the knowledge of the discipline, it was not assessed.

The lecturers bring problems of the society in the field of engineering in order to integrate our studies with professional life. Nevertheless, we have had those assignments of do this, do that or calculate a support x but students sometimes do not understand [these assignments] because there is no real data. Furthermore, the lecturers bring pictures or videos to the class or they take us to study visit and try to explain issues in the discipline and in general and raise issues that we should know and pay attention.

Variable 4: Research-led

We have a guidance which determines how we should do essays, but we never investigate about the guidance so we exactly follow those recommendations when we use regulations, especially in dimensioning of roads and bridges.

Even though some people say that engineering science is accurate, it is no as accurate as we think. Therefore, each author does his/her recommendations according to his or her experience, but the most important for us is a regulation that we should respect because in case of a problem in a construction work, the instrument that we can use to solve the problem is a regulation.

We have some well-informed lecturers who bring to the class issues that occur in the world associated with civil engineering and they have commented about current research related to some aspects of engineering although it is not a deep comment. In addition, some lecturers present slides or videos about research that has already been done. Furthermore, the lecturers give us attention about problems of engineering in society as a way of integrating students in the professional life.

The lecturers in my course are more concerned with giving information, For example, they raise or explain issues that we should know and pay attention to them. However, we have commented that we are more theoretical professional since we do not have much practice.

We do written tests or laboratory tests and examinations during and at the end of the semester respectively. Besides written assessment, we have done oral assessment.In addition, we have had calculation assignments as well as dimensioning of construction works as assessment activities. Nonetheless, the most important that I have understood throughout the four years of my course is that laboratory assignments or essays are more important to consolidate the knowledge taught in lectures.

Apendice D: Entrevistas para estudantes sobre a ligação do ensino e a pesquisa no Curso de Engenharia Civil da Faculdade de Engenharia-UEM

Sou estudante do Curso de Mestrado em Estudos do Ensino Superior e Desenvolvimento da Faculdade de Educação na UEM e estou a desenvolver um projecto de dissertação do tema intitulado "A Integração do Ensino e a Pesquisa nos Currícula do Ensino Superior", o Estudo de Caso da UEM. Esta entrevista destina-se para estudantes de licenciatura do Curso de Educação Ambiental da Faculdade de Educação na UEM. O propósito desta entrevista é de conhecer as suas experiências relativas a integração do ensino e a pesquisa ao longo do seu curso de licenciatura. A entrevista está dividida em quatro questões principais com as suas respectivas perguntas que têm como ojectivo de conhecer os tipos de actividades de aprendizagem, formas de interação e tipos de avaliação que os estudantes realizam durante o processo de ensino e aprendizagem com vista a integrar o ensino e a pesquisa no ensino superior. Igualmente, a entrevista tem como objectivo de perceber como é que sente ou pensa sobre a integração do ensino e a pesquisa no seu curso. Aentrevista terá a duração de aproximadamente 40 minutos. As suas respostas vão ajudar-nos analisar os tipos de currícula, métodos e práticas de ensino que os docentes usam para integrar o ensino e a pesquisa no ensino superior. Porém, as suas respostas serão mantidas confidenciais e os resultados serão usados para os fins de pesquisa somente.

Guião de entrevista

1. **Envolvimento de estudantes em pesquisas originais (curriculum-baseado em pesquisas)**

a) Tem realizado projectos de pesquisa individuais ou em grupos ao longo do seu curso de licenciatura? Em caso afirmativo, por favor descreva os projectos de pesquisa que já realizou.

b) Tem realizado entrevistas como trabalho de campo para projectos de pesquisa ao longo do seu curso? Em caso afirmativo, por favor dê exemplos de entrevistas que já realizou como trabalho de campo.

c) Tem realizado observações como trabalho de campo para projectos de pesquisa durante o seu curso? Em caso afirmativo, por favor dê exemplos de

observações de campo que já realizou durante o seu curso.

d) Tem sido solicitado pelos seus docentes para dar assistência na realização dos seus projectos de pesquisa ao nível do seu curso, departamento ou faculdade? Em caso afirmativo, por favor informe a assistência que já deu para os projectos de pesquisa dos seus docentes.
e) Tem alguma experiência de colectar ou analisar dados para projectos de pesquisa dos seus docentes ao nível do curso, departamento/faculdade? Em caso afirmativo, por favor dê exemplos de dados que ja colectou ou analisou?
f) Tem escrito ou apresentado projectos de pesquisa como actividade de avaliação durante o seu curso? Em caso afirmativo, quais foram os critérios usados para avaliação de projectos que já escreveu ou apresentou?
g) Tem realizado entrevistas ou observações de campo como actividades de avaliação durante o seu curso? Em caso afirmativo, quais foram os critérios usados para avaliação das entrevistas ou observações que já realizou?

2. Envolvimento de estudantes na discussão ou análise de ensaios académicos (currículo baseado em discussões sobre pesquisa)

a) Tem escrito ensaios académicos? Em caso afirmativo, Por favor dê exemplos de temas que tem escrito.
b) Os seus docentes têm lhe fornecido uma bibliografia obrigatória a fim de ler e depois elaborar ensaios académicos? Em caso afirmativo, poderia informar se a bibliografia obrigatória fornecida pelos docentes é sobre a sua área de estudo somente ou outras áreas.
c) Os seus docentes têm lhe recomendado literatura para ler a fim de produzir ensaios académicos? Em caso afirmativo, poderia informar se a literatura recomendada é sobre a sua área de estudo ou outras áreas.
d) Ao longo do seu curso, tem tido temas para escrever sobre a assistência do seu docente como tutor (supervisor) dentro do seu curso ou sobre assistência doutros docentes como tutores dentro ou fora do seu curso? Em caso afirmativo, quantas vezes por semana ou mês encontra-se com seu tutor para supervisão de ensaios académicos?
e) Tem apresentado trabalhos académicos tais como ensaios para discussão na sala de aulas? Em caso afirmativo, por favor informe como é que apresentação

e discussão são feitas?

f) Tem tutorado (supervisionado) trabalhos académicos (e.g. ensaios) doutros estudantes? Em caso afirmativo, por favor informe como é que a tutoria (supervisão) é feita.

g) Os seus docentes exigem-lhe fazer a revisão crítica da literature? Em caso afirmativo, qual é a importância da revisão crítica da literatura segundo a sua experiência?

h) Os seus docents têm dado avaliação sobre a escrita de ensaios académicos durante ou no final do semester? Em caso afirmativo, quais são os critérios usados para avaliação escrita de ensaios académicos?

i) Os seus docents têm dado avaliação sobre a apresentação oral de ensaios académicos durante ou no final do semester? Em caso afirmativo, quais são os critérios usados para avaliação de apresentação oral de ensaios académicos?

j) Os seus docentes têm dado avaliação sobre a revisão crítica da literatura? Em caso afirmativo, por favor dê exemplos dos aspectos que os seus docentes gostariam que dominasse em relação à revisão crítica da literatura.

3. Construção de conhecimento na disciplina (currículo com orientação da pesquisa)

a) Os seus docentes têm criados cenários ou situações sobre problemas da vida real na sua área de estudo para os estudantes discutirem? Em caso afirmativo, por favor informe como é que é a discussão de problemas é feita na sala de aulas?

b) Os seus docentes têm formulados perguntas de pesquisa ou hipóteses para os estudantes realizarem pesquisa? Em caso afirmativo, por favor dê exemplos de perguntas ou hipóteses que os docentes têm formulados para os estudantes?

c) É avaliado em resolução de problemas na sua especialidade durante ou no final do semestre? Em caso afirmativo, por favor informe como é que a avaliação em resolução de problemas na sua especialidade é feita?

d) Os seus docentes têm formulado perguntas de pesquisa ou hipóteses para os estudantes darem possíveis respostas ou explicação como forma de avaliação durante ou no final de semestre? Em caso afirmativo, por favor informe como é que a avaliação é feita?

4. **Aprendizagem sobre pesquisas feitas por outros (currículo de pesquisa direcionada)**

a) Tem analisado metodologias de investigação ou conclusões de estudos já feitos ao nível da disciplina? Em caso afirmativo o que tem analisado nas metodologias de investigação ou conclusões dos estudos já realizados?

b) Os seus docentes têm dado apresentações sobre pesquisas recentes dentro da disciplina durante as aulas? Em caso afimativo, por favor dê exemplos de pesquisas recentes que os seus docentes já apresentaram?

c) Os seus docentes têm usado dissertações ou teses já produzidos como modelos para estudantes aprenderem como fazer pesquisa? Em caso afirmativo, qual é o seu sentimento sobre o uso de dissertações ou teses já produzidas como modelos para estudantes fazerem pesquisa?

d) Por favor mencione o tipo de testes ou exames que tem realizado durante ou no final do semestre.

e) Por favor mencione trabalhos académicos que tem realizado como forma de avaliação durante ou no final do curso.

f) Segundo as suas experiências ao longo do seu curso de licenciatura, acha que os estudantes do seu curso fazem pesquisa? Porquê/porquê não?

Muito obrigado pelo seu tempo dispensado!

Appendix E: Interview for lecturers about research and teaching linkages in the EELC of the Faculty of Education-UEM

I am a master student from Higher Education Studies and Development Course in the Faculty of Education-UEM and I am working on my dissertation project. The topic of the dissertation project is entitled 'Research-teaching nexus in Mozambican Higher Education Curricula', the case study of UEM. I have designed this interview for lecturers in the Environmental Education Course of the Faculty of Education at UEM. The purpose of this interview is to understand how the lecturers bring teaching and research together in higher education through curriculum designs and teaching practices in the course that they lecture. The interview is divided into four main items with their respective questions intended to understand the types of teaching and learning activities, interaction patterns and types of assessments that lecturers use in attempt to integrate teaching and research in their area of the study. Likewise, the interview intends to obtain lecturers' experiences, perceptions, feelings or points of view about the integration of teaching and research in higher education. The interview will take approximately 40 minutes. The lecturer's answers will help us to analyse the effectiveness of curriculum designs and teaching practices used by the lecturer in attempt to link research and teaching in higher education. The lecturer's responses will be kept strictly confidential and the results will be used for research purpose only.

Interview guide

1. Teaching and learning in research mode (research-based curriculum)

a) Have you done research projects with your undergraduate students? If yes, would you please describe the research projects you have done with your students?

b) Do your students conduct interviews or observations in the field throughout their course? If yes, would you please give examples of the interviews or observations that your students conduct in the field?

c) Do your students assist the lecturers' research projects during their course? If yes, would you please inform what assistance your students provide for the lecturers' research projects?

d) Do you ask your students to write or present their research projects as assessment activities during the course? If yes, would you please inform how you assess your students through research projects?

e) Do you ask your students to conduct interviews or observations in the field as assessment activities during the course? If yes, what are the criteria for the assessment?

2. Engagement of students in research discussions (research-tutored curriculum)

a) Do you ask your students to present their academic essays or papers for class discussion during lectures? If yes, would you inform how the presentation and discussion are done?

b) Do you assign your students writing topics under your tutorial (supervision) or under tutorial of lecturers from the course you lecture or lecturers from other courses? If yes, how often do you/other lecturers meet with students in a week or a month for tutorial of academic essays or paper writing?

c) Do you provide your students compulsory bibliography in order to read and write academic essays or papers? If yes, would you please inform whether the compulsory bibliography is concerned with the discipline you lecture or other disciplines?

d) Do you provide your students recommended bibliography in order to read and write academic essays or papers? If yes, would you please inform whether the recommended bibliography is concerned with the discipline you lecture or other disciplines?

e) Do you ask your students to do critical analysis of their partner's academic essays or papers as a tutorial (supervision) assignment? If yes, would you inform how the tutorial is done?

f) Do you train your students how to do literature review and critique? If yes, would you please inform what your students need to master on the literature review and critique?

g) Do you assess your students on writing of academic essays or papers during or at the end of the course? If yes, what are the criteria of the assessment you use?

h) Do you assess your students on oral presentation of academic essays or papers during or at the end of the course? If yes, would you please inform how it is done?

3. Developing of research skills and techniques (research-oriented curriculum)

a) Do you provide scenarios or situations of real life problems for students to discuss and find possible solutions during lectures? If yes, would you please inform whether the problems for discussion is concerned with your specialised area of the study or other areas?

b) Do you formulate questions or hypotheses for students to find possible answers or explanation? If yes, would you please give examples of questions or hypotheses you have formulated for students?

c) Do you assess your students on problem solving during or at the end of a semester? If yes, would you please inform how the assessment is done?

d) Do you assess your students on answering questions or hypotheses during or at the end of a semester? If yes, would you please inform how the assessment is done?

4. Learning about others' research (research-led curriculum)

a) Do you ask your students to analyse research methodologies or research findings of the studies already conducted in your area of the study? If yes, what do you usually analyse in methodologies or research findings?

b) Do you present current research in the subject (discipline) you lecture? If yes, would you please inform your aims of providing current research in the subject you lecture?

c) Do you use dissertations or theses that have already been produced as models for your students to do research? If yes, how do you feel about using dissertations or theses that have already been produced as models for your students to do research?

d) Would you please mention the type of tests or examinations you have conducted for your students during or at the end of a semester?

e) Would you please mention the assignments you have given to your students during or at the end of a semester?

f) According to your experiences throughout the undergraduate licenciatura course you lecture, do you think that undergraduate students do research? Why/why not?

Thank you for your time!

Table 4: Discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in EELC of the Faculty of Education-UEM

Variable 1: Research-based
I have conducted research projects with my students. Now, I am developing a research project with one of my students about satisfaction of environmental education licenciatura students with their course including teaching methods. Another project that is going on is about the level of satisfaction of people who use improved cooking stoves as it is believed that the improved cooking stoves are important to the environment. In this project, I have worked with year 3 licenciatura students, yet, the selection criteria of the students who participate in the project depends on the talent and interests of the student. Sometimes, I make a competition between students in the class with three criteria as follows: First, students should be in year 3 or year 4 and they should not have disciplines that they have failed in the previous years. Second, the student should have good academic records. At last, the student should have basic knowledge of English. On the whole, we look for the best students to assist the projects of lecturers. Students have undertaken fieldwork interviews and observations. For example, the students have conducted fieldwork interviews and observations about the project regarding to improved cooking stoves in which students not only interviewed the users of the improved stoves but also they observed the stoves. After the field interview and observation, students had to analyse the data. Moreover, we have had activities such as environmental education practices aimed to interact students with the community in order to find out environmental problems and analyse whether they are actually environmental problems or not after interviewing the community. Likewise, we have some lectures about environmental practices in some disciplines. For example, in my discipline which is Climate and Climate Changes, we have done interviews and observations in order to link environmental problems to climate and how people react to this kind of problems. Then we relate the problem to socio-environmental aspects and its discipline. After the observations and interviews, students analyse the data. At the beginning of the subject, we recommend students to select their own topics and

develop research projects according to the discipline and at the end the semester these projects are assessed.

We have some research projects that we have involved our students even though we cannot say that students conduct research, but we can say that they participate in the lectures' research and use this experience for their monographs. In addition, I would be happy if all students of the EELC finished their course with monographs while some students do bibliography and others do an internship report, I cannot express my satisfaction with students' research.

Variable 2: Research-tutored

Development and presentations of essays is one of the compulsory components during and at the end of the semester. Therefore, all subjects that have essays are interactive through presentations. In this case, my students conduct more assignments in groups so that they can have a variety of ideas and space for discussion. In addition, the essays that students develop are classified into two parts namely the development of the report and its presentation. In this context, the presentation of essays is done in groups and during the presentation the class is an audience. After presentation of each group, the class asks questions and gives contributions in different perspectives about the topic presented. In this way, the discussion starts and all of us discuss in a seminar way where we sit in a form of a round table. However, often, my intervention is at the end of the discussion. Also, students have presented their essays in 'jornadas cientificas'. For instance, in the 'jornadas cientificas' held in the Faculty of Education in 2013, some students in the EELC presented their essays.

In the discipline that I lecture I assign topics to students in order to write and essays. After that, students present and defend their essays in groups and in seminars, but I monitor how students approach the concepts. Furthermore, in the discipline of research methods, every single student has his/her research topic to develop. Nevertheless, the research methods are taught in the first year of the course, consequently students do not necessarily produce research instead they produce a research protocol of their optional research topic. In this context, I monitor students how they organise their work in different stages of the research protocol.

Notwithstanding, for development of monographs [the end of the course projects or capstone projects], the lecturers propose a list of topics for student to write their monographs, but we also allow students to propose their own research topics in the area of the study. Likewise, we have supervised monographs of the students in year 4 so during this period we meet with students once a week for tutoring.

I have provided students basic literature of the discipline and the same literature can be used to develop other assignments in the discipline. Besides, in analytic plan, we put the main and secondary bibliography. The main bibliography is aimed to integrate students in the discipline and introduce or guide the knowledge of the discipline. In other words, the main bibliography is used to support and monitor the discipline as well as a technical and scientific framework.

We provide the main bibliography and discussion topics. Then we divide students in small groups to write assignments and do oral presentation and defence. In this case, we give students bibliography to read about many topics and summarise the information in worksheets. For example, before discussing any topic, students should bring their worksheets as a basis for discussion. In this way, the worksheets stimulate students for discussion. Also, I have recommended students to use relevant bibliography for their assignments according to the topic, actions and other issues in the discipline.

I teach my students how to do literature review and critique. However, I have noted that when students do literature review, they do not question the literature and they do not adapt the literature to our reality as most of literature is Brazilian. Despite lecturers demanding students to do literature review and critique as well as correct use of citations and bibliography, students have many problems concerning with these issues. Instead of doing literature review and critique students, mainly from year 1, year 2, and year 3, read and transcribe information specifically from internet and sometimes students do not write the reference in their work. Furthermore, during the literature review, students do not discuss concepts with more than two or three authors who could help students develop a variety of ideas and critical thinking.

Assessment of students on writing and presentation of essays is one of the main pillars of our course. Thus, students write and present their essays in the classroom and as a stimulus I assess the written and the oral test. During presentation of essays I assess students on the level of the answers given and their scholarship. Nevertheless, I give more priority to group assessment so that students can have space to discuss knowledge in seminars. In this context, I have also assessed the development of concepts, that is to say, how the students discuss the concepts into practice. Likewise, I have assessed how students follow the recommended steps for development of assignments such as surveys, questionnaires and discussion of results.

During the teaching-learning process, we have done qualitative assessment in order to stimulate the participation of the students during lectures. As a consequence, qualitative assessment turns into quantitative at the end of the semester so that we can stimulate students to be the centre of teaching learning process. Nonetheless, to motivate students' participation in the lecture, I tell them that they will have qualitative and quantitative assessment, but I announce the grade of the qualitative assessment at the end of the semester, yet in lectures I jot down the level of participation of every single student according to the scholarship of knowledge discussion through the support of literature.

Variable 3: Research-oriented

Creation of scenarios or situations for discussion in the class depends on the discipline. In the discipline that I lecture, which is Climates and Climates changes, I have linked problems of climate and how people react to this kind of problems through discussion in the class. In this context, I create scenarios and I raise a daily situation about environmental education, for example how you would involve a community in situation x.

I am going to talk about disciplines that require problematisation namely the discipline of Community Management, Environmental Education and Research Methods. Problematisation is how the students approach the problem, raise issues and analyse the problem in a scientific way so this is the problematisation that I deal

with.In this context, the discipline of Community Management involves discussion of participative management. Thus, I create situations to engage students in discussion while in the discipline of Environmental Education we are concerning with assessment of environmental impacts about a variety of daily or real life environmental problems, for instance the urban waste management and the preservation of flora and fauna. Similarly, we discuss how an environmental educator should behave and link environmental impacts in different areas such as agriculture, health and infrastructures in Mozambique as the climate changes in this country create hardship in different areas especially in health where the climate changes cause many diseases. Furthermore, our topics for discussion include floods that affect agriculture. In this case, we have had discussion about the problem of floods in attempt to find out possible solutions to mitigate this problem.

Throughout the course, we have assessed our students on discussion and solutions of environmental problems during fieldwork activities. In these activities, we supervise students' fieldwork and we do qualitative assessment on the fieldwork activities such as interviews. However, we have taken our students to the field in order to live the real situation of physical planning such as community ordering and this leads us to discuss how people have been resettled in the community and analyse whether there is physical planning or not.

Variable 4: Research-led

I have presented current research in the discipline as a model for student to learn how to do research since it is one of the ways to show how students can do research and stimulate students' research. This way can help students be aware of formulation of research aims. On the one hand, current research in the discipline can motivate students to do research projects such as monographs instead of internships, on the other hand the current research in the discipline can make students be aware of the world knowledge evolution since it gives analysis or real problems. Furthermore, recent research can be a model for students to see how things are done, for example how to deal with a research topic, literature review or data discussion.

In spite of giving students a model from the research already conducted to learn how

to do research, it is important to give students a model from the work done by their fellow students. In this way, the student can feel that if my fellow student did the work, I can do it as well, as a result, this can motivate students do to their own research since they have a starting point.

We have given some written tests and examinations to our students as assessment activities and we have also given oral presentations during the course. Nonetheless, the assessment of the oral presentation consists of assignments in which the student chooses a topic and produces a report of fieldwork research based on the review of literature.

Students conduct research and bring much information, but they do not criticise the information. This means that students do research, yet it lacks quality because of poor critical view of students in their research which is linked to the lack of bibliography as our library has more literature written in English than in Portuguese which is the official language. However, students do not master English, as a consequence they use Google Translator without analysis and discussion of information, that is, they do copy and paste of the information from internet to compose their essays.

Apendice F: Entrevistas para docentes sobre a ligação do ensino e a pesquisa no Curso de Educação Ambiental da Faculdade de Educação-UEM

Sou estudante do Curso de Mestrado em Estudos do Ensino Superior e Desenvolvimento da Faculdade de Educação na UEM e estou a desenvolver um projecto de dissertação do tema intitulado "A Integração do Ensino e a Pesquisa nos Currícula do Ensino Superior", o Estudo de Caso da UEM. Esta entrevista destina-se para docentes do Curso de Educação Ambiental da Faculdade de Educação. O propósito desta entrevista é de perceber como é que o docente integra o ensino e a pesquisa através de desenhos curriculares e práticas de ensino no curso que lecciona. A entrevista está dividida em quatro questões principais com as suas respectivas perguntas que têm como ojectivo de conhecer as actividades de aprendizagem, formas de interação, e avaliação que o docente usa para integrar o ensino e a pesquisa. Ao mesmo tempo, a entrevista tem como objectivo de perceber as experiências, sensações ou pontos de vista do docente sobre a integração do ensino e a pesquisa no ensino superior. A entrevista terá a duração de aproximadamente 40 minutos. As suas respostas vão ajudar-nos analisar a efectividade de currícula, métodos e as práticas de ensino que os docentes usam para integrar o ensino e a pesquisa no ensino superior. Porém, as suas respostas serão mantidas confidenciais e os resultados serão usados para os fins de pesquisa somente.

Guião de entrevista

1. **Ensino e aprendizagem em forma de pesquisa (currículo baseado em pesquisa)**

a) Tem realizado projectos de pesquisa com os seu estudantes de licenciatura? Em caso afirmativo positivo, por favor descreva os projectos de pesquisa que já realizou com os seus estudantes de licenciatura?

b) Os seus estudantes realizam entrevistas ou observações de campo durante o curso? Em caso afirmativo positivo, dê exemplos de entrevistas ou observações de campo que os seus estudantes já realizaram?

c) Os seus estudantes têm dado assistência aos projectos de pesquisa dos seus docentes durante o curso? Em caso afirmativo positivo, por favor informe a assistência que os seus estudantes têm dado aos projectos de pesquisa dos seus

docentes.

d) Tem avaliado os seus estudantes em elaboração ou apresentação de projectos de pesquisa durante o curso? Em caso afirmativo positivo, por favor informe os critérios que tem usado para a avaliação de projectos de pesquisa dos seus estudantes.

e) Tem avaliado os seus estudantes em realização de entrevista ou observações de campo durante o curso? Em caso afirmativo positivo, por favor informe os critérios que tem usado para a avaliação de entrevistas ou observações de campo realizadas pelos seus estudantes.

2. Envolvimento de estudantes em discussões sobre pesquisa (currículo baseado em discussão sobre pesquisa)

a) Os seus estudantes têm apresentado trabalhos académicos (e.g. ensaios académicos) para a discussão na sala de aulas? Em caso afirmativo positivo, por favor informe como é que a apresentação e discussão são feitas.

b) Tem dado temas aos seus estudantes para escrever sobre a sua assistência como docente e tutor (supervisor) ou sobre a assistência doutros docentes como tutores dentro ou fora do curso que lecciona? Em caso afirmativo positivo, quantas vezes por semana ou mês os docentes encontram-se com os seus estudantes para supervisão de ensaios académicos?

c) Tem fornecido aos seus estudantes uma bibliografia obrigatória a fim de ler e depois elaborar ensaios académicos? Em caso afirmativo positivo, por favor informe se a bibliografia obrigatória que fornece aos seus estudantes é relacionada com a matéria da disciplina/módulo que lecciona somente ou outras disciplinas/módulos.

d) Tem recomendado aos seus estudantes literatura para ler afim de produzir ensaios académicos? Em caso afirmativo positivo, por favor informe se a literatura recomendada é relacionada com com a matéria da disciplina/módulo que lecciona somente ou outras disciplinas/módulos.

e) Os seus estudantes têm tutorado (supervisionado) trabalhos académicos (e.g. ensaios) doutros estudantes? Em caso afirmativo positivo, por favor informe como é que a tutoria (supervisão) entre estudantes é feita.

f) Ensina os seus estudantes como fazer a revisão crítica da literature? Em caso

afirmativo positivo, por favor informe o que os seus estudantes devem dominar na revisão crítica da literatura.

g) Tem avaliado os seus estudantes em elaboração de ensaios académicos durante ou no final do semester? Em caso afirmativo positivo, quais são os critérios que usa para avaliar os ensaios académicos dos seus estudantes?

h) Tem avaliado os seus estudantes em apresentação oral de ensaios académicos durante ou no final do semester? Em caso afirmativo positivo, quais são os critérios que usa para avaliar a apresentação oral dos ensaios académicos dos seus estudantes?

3. Desenvolvimento das habilidades e técnicas de pesquisa (currículo com orientação de pesquisa)

a) Tem criado cenários ou situações sobre problemas da vida real da disciplina que lecciona papa os estudantes discutirem? Em caso afirmativo positivo, por favor informe como é que é a discussão de problemas da vida real da disciplina é feita na sala de aulas?

b) Tem formulado perguntas de pesquisa ou hipóteses para os seus estudantes realizarem pesquisa? Em caso afirmativo, por favor dê exemplos de perguntas ou hipóteses que já formulou para os estudantes fazerem pesquisa ?

c) Tem avaliado os seus estudantes em resolução de problemas durante ou no final do semestre? Em caso afirmativo positivo, por favor informe como é que avalia os seus estudantes em resolução de problemas?

d) Tem formulado perguntas de pesquisa ou hipóteses para os estudantes darem possíveis respostas ou explicação como forma de avaliação durante ou no final de semestre? Em caso afirmativo positivo, por favor informe como é que avalia os seus estudantes através perguntas de pesquisa ou hipóteses.

4. Aprendizagem sobre pesquisas feitas por outros (currículo da pesquisa direcionada)

a) Os seus estudantes têm analisado metodologias de investigação ou conclusões de pesquisas já realizadas ao nível da disciplina? Em caso afirmativo positivo, por favor informe o que os seus estudantes têm analisado nas metodologias de de investigação ou conclusões das pesquisas já realizadas?

b) Tem dado apresentações sobre pesquisas recentes dentro da disciplina durante

as aulas? Em caso afimativo positivo, Por favor informe o seu seu objectivo central de apresentar pesquisas recentes dentro da disciplina que lecciona?

c) Tem usado pesquisas já feitas (e.g. dissertações ou teses) como modelos para os seus estudantes aprenderem como fazer pesquisa? Em caso afirmativo positivo, qual é o seu sentimento sobre o uso de pesquisas já feitas (e.g. dissertações ou teses) como modelos para os seus estudantes aprenderem como fazer pesquisa?
d) Por favor mencione tipos de testes ou exames que tem dado aos seus estudantes durante ou no final do semestre.
e) Por favor mencione tipos de trabalhos académicos que os seus esudantes realizam durante ou no final do semestre.
f) Segundo as suas experiências ao longo do curso de licenciatura que lecciona , acha que os estudantes realizam pesquisa? Porquê/porquê não?

Muito obrigado pelo seu tempo dispensado!

Appendix: G Interviews for lecturers about research and teaching linkages in the CELC of the Faculty of Engineering-UEM

I am a master student from Higher Education Studies and Development Course in the Faculty of Education at UEM and I am working on my dissertation project. The topic of the dissertation project is entitled 'Research-teaching nexus in Mozambican Higher Education Curricula', the case study of UEM. I have designed this interview for lecturers in the Civil Engineering Course of the Faculty of Engineering at UEM. The purpose of this interview is to understand how the lecturers bring teaching and research together in higher education through curriculum designs and teaching practices in the course that they lecture. The interview is divided into four main items with their respective questions intended to understand the types of teaching and learning activities, interaction patterns and types of assessment that lecturers use in attempt to integrate teaching and research in their area of the study. Likewise, the interview intends to obtain lecturers' experiences, perceptions, feelings or points of view about the integration of teaching and research in higher education. The interview will take approximately 40 minutes. The lecturer's answers will help us to analyse the effectiveness of curriculum designs and teaching practices used by the lecturer in attempt to link research and teaching in higher education. The lecturer's responses will be kept strictly confidential and the results will be used for research purpose only.

Interview guide

1. Teaching and learning in research mode (research-based curriculum)

a) Have you done research projects with your undergraduate students? If yes, would you please describe the research projects you have done with your students?

b) Do your students conduct interviews or observations in the field throughout their course? If yes, would you please give examples of the interviews or observations that your students conduct in the field?

c) Do your students assist the lecturers' research projects during their course? If yes, would you please inform what assistance your students provide for the lecturers' research projects?

d) Do you ask your students to write or present their research projects as assessment activities during the course? If yes, would you please inform how you assess your students through research projects?

e) Do you ask your students to conduct interviews or observations in the field as assessment activities during the course? If yes, what are the criteria for the assessment?

2. Engagement of students in research discussions (research-tutored curriculum)

a) Do you ask your students to present their academic essays or papers for class discussion during lectures? If yes, would you inform how the presentation and discussion are done?

b) Do you assign your students writing topics under your tutorial (supervision) or under tutorial of lecturers from the course you lecture or lecturers from other courses? If yes, how often do you/other lecturers meet with students in a week or a month for tutorial of academic essays or paper writing?

c) Do you provide your students compulsory bibliography in order to read and write academic essays or papers? If yes, would you please inform whether the compulsory bibliography is concerned with the discipline you lecture or other disciplines?

d) Do you provide your students recommended bibliography in order to read and write academic essays or papers? If yes, would you please inform whether the recommended bibliography is concerned with the discipline you lecture or other disciplines?

e) Do you ask your students to do critical analysis of their partner's academic essays or papers as a tutorial (supervision) assignment? If yes, would you inform how the tutorial is done?

f) Do you train your students how to do literature review and critique? If yes, would you please inform what your students need to master on the literature review and critique?

g) Do you assess your students on writing of academic essays or papers during or at the end of the course? If yes, what are the criteria of the assessment you use?

h) Do you assess your students on oral presentation of academic essays or papers during or at the end of the course? If yes, would you please inform how it is done?

3. Developing of research skills and techniques (research-oriented curriculum)

a) Do you provide scenarios or situations of real life problems for students to discuss and find possible solutions during lectures? If yes, would you please inform whether the problems for discussion is concerned with your specialised area of the study or other areas?

b) Do you formulate questions or hypotheses for students to find possible answers or explanation? If yes, would you please give examples of questions or hypotheses you have formulated for students?

c) Do you assess your students on problem solving during or at the end of a semester? If yes, would you please inform how the assessment is done?

d) Do you assess your students on answering questions or hypotheses during or at the end of a semester? If yes, would you please inform how the assessment is done?

4. Learning about others' research (research-led curriculum)

a) Do you ask your students to analyse research methodologies or research findings of the studies already conducted in your area of the study? If yes, what do you usually analyse in methodologies or research findings?

b) Do you present current research in the subject (discipline) you lecture? If yes, would you please inform your aims of providing current research in the subject you lecture?

c) Do you use dissertations or theses that have already been produced as models for your students to do research? If yes, how do you feel about using dissertations or theses that have already been produced as models for your students to do research?

d) Would you please mention the type of tests or examinations you have conducted for your students during or at the end of a semester?

e) Would you please mention the assignments you have given to your students during or at the end of a semester?

f) According to your experiences throughout the undergraduate licenciatura course you lecture, do you think that students do research? Why/why not?

Thank you for your time!

Table 5: Discourse of the collective subject from the semi-structured qualitative interview with year 4 lecturers in the CELC of the Faculty of Engineering-UEM

Variable 1: Research-based
I have conducted research projects with my students in collaboration with Engineering Laboratory of Mozambique [outside of the Faculty of Engineering]. However, the assignments done are integrated according to the guidelines and interest designed by the laboratory. For example, I developed three final course projects with my students. The first project was developed by a student about the use of limestone in production of concrete. The second project included reutilisation of solid waste in construction or rehabilitation for the purpose of producing new concrete or materials of mortar and the last project was about the behaviour, analise, assessment and security of the bridges named Ponte de Rio Save and Ponte de Xai-Xai. Furthermore, we have analised projects in the discipline called the End of the Course Project as well as internships that students do during the course. Nevertheless, it is important to divide the projects into two parts such as projects at the level of the discipline and discipline of end of course projects done in the fourth year of the course. In the project of the discipline, students receive assignments and read some bibliography and after that they do some calculation and write a report and defend it in the classroom in groups or individually. Whereas, in the discipline of the End of the Course Projects, students are given course projects assignments at the beginning of the semester and these projects are monitored by the lecturer. However, students have done licenciatura course projects or professional internships to finish their licenciatura course. In this case, licenciatura projects consist of investigation of the elements needed to calculate a construction work. For example, the investigation of elements needed to calculate a bridge or its foundation and essays required. Then the student develops a project and defends it publically. My students are integrated in teams in order to do laboratory activities specifically data collection, treatment of information and monitoring of laboratory essays. Simultaneously, students develop test patterns for translation of structure behaviour under my supervision. Meanwhile, this is done in the last semester of the course as a

licenciatura capstone project. In this semester, students are recruited in order to do investigation even though it is not a systematic process. Sometimes, students participate in essay activities and laboratory experiences in the disciplines such as Construction of Materials, Concrete, Bridges and Public Works.

It is not common for the lecturer to invite students for assistance of lecturers' research projects for two reasons as follow: first, in my opinion, there is no condition at the level of engineering disciplines for doing research due to the lack of means. Second, if we have research work, it is linked to a particular and tight objective that does not match with time and curriculum obligations of the students. Besides, students have low capacity for doing research, yet the student may have a project in which I also have a benefit so we can do the project together. In this case, my objective is to develop students' capacity for enquiry and research.

I have assessed my students on fieldwork interviews and observations and this have occurred in the licenciatura capstone projects. Nonetheless, in my opinion, this component of research should be incorporated throughout the curriculum because at the end of the course students could have a solid notion to start a research career. Therefore, I would like to suggest the creation of continuous grants for students if it is possible for the initiation of research in order to stimulate students to follow a research career.

I have never assessed my students on development and presentation of research projects since my discipline consists of laboratory work which limits on showing some equipment and techniques how things should be done, for instance how to prepare a sample. In addition, the curriculum does not have space to integrate a component of research projects. Consequently, we end up doing laboratory assignments, but a large number of these assignments are done in collaboration with Engineering Laboratory of Mozambique [outside of the faculty]. In this context, the students of the Faculty of Engineering go to the laboratory mentioned earlier in order to assist laboratory essays there.

Variable 2: Research-tutored

In the discipline that I lecture**,** I give priority to presentations such as presentation of laboratory assignments and the presentations are done in groups, but as the streams are large ones which vary between 60-70 students so the class is subdivided into small groups of 9-10 students. In this context, the groups do presentations one at a time, even so every single member of the group is responsible for presenting his/her own part and also he/she should master the knowledge of the whole presentation of the group for possible questions that can be asked to the group in general. While the group is presenting its assignments before the class, the rest of the class is an audience, but after the presentation of the group I give the class opportunities to raise questions, doubts or request for clarification of some issues. At last, I raise my questions and I give final considerations or a point of view about the presentation done by the group.

There are assignments that have been done as the end of the course projects during the semester. In this case, students are given course projects assignments at the beginning of the semester and these projects are monitored by the lecturer. Whenever there are related disciplines we collaborate with other lecturers from other disciplines. For example, I can have an issue that I would like my student to develop but it involves concepts or knowledge from other disciplines so the student can consult other lecturers although it is not common. By contrast, the project of the discipline consists of lectures and assignments that students conduct. During the development of the project of the discipline, doubts appear, thus students are given space to raise their doubts at the end of the lecture or on the agreed time between the lecturer and students. Then the lecturer meets with the students in order to clarify doubts.

On the whole, in both the end of the course projects and the projects of the discipline, students acquire tools and knowledge during lectures that will feed their research work.

At the beginning of the semester, I present the main bibliography and methods of assessment and throughout the semester I have provided students bibliography that includes slides from power point after my presentation. Also, I have provided

students a workbook or handbook which is a basic manual of the discipline. Furthermore, I have given students complementary hardcopy and electronic bibliography that I regard as fundamental for students to acquire knowledge in the discipline and develop their worksheets in order to facilitate the comprehension of issues discussed in the classroom.

In regard to the end of the course project assignments, we have recommended many materials for literature review, yet the students should research bibliography by themselves. Moreover, I advise my students not only to read literature in the local library but also to read literature from the internet and present questions or doubts in the classroom to enrich the lectures and students themselves. As a result, this creates reading and research culture of the students. Despite students not having a curriculum obligation or lecturer's obligation for supervising or monitoring the work of other students, we recommend the more advanced students to help others but it is not regulated.

We have done literature review, for example we have produced handouts and workbooks. However, we have criticised students regarding to literature review since the students like going directly to the objective. As a consequence, they do not deeply discuss what is around the problems. In addition, students do research and find out some answers, the sources are not reliable and others contain errors.

We have involved our students in presentation of their work in 'Jornadas científicas' sponsored by the Ministry for Science and Technology. Moreover, in the discipline that I lecture which is the End of the Course Project, we have presentations and oral exams as assessment activities. In this kind of activities, I have assessed not only the level of knowledge but also attitudes of the student, his/her determination and the command of content knowledge of the discipline. Usually, the written work has quantitative and qualitative assessment. Qualitative assessment aims to analyse the strong and weak points of the commitment of the student with learning process and give them advice.

The assignments developed during the course consist of written work and oral presentations, but their assessment depends on the dimensions of the assignment. In

this case, if it is an individual work, the student submits his/her work to the lecturer for marking. On the contrary, if it is a group work, the group does oral presentation and defence and then the lecturer assesses it. After that, the lecturer gives marks for the written and oral presentation.

Variable 3: Research-oriented

We have created scenarios about real life problems in the discipline for students to discuss. In this context, in all lectures that we give, we fit the scenarios to the reality of our cities, country and other countries. For instance, we question about the work of engineering that are reported in the media at national and international level. In this case, we try to integrate theoretical problems from literature with practice. Sometimes, we analyse and discuss problems and real culture of engineering in order to understand the views of students associated with their level of knowledge acquired as well as the solutions or alternatives that students can give to certain problems that happen in daily life. For example, in the assignments of coursework that I supervise, students have focused on components of problems and real culture specifically the use of limestone for low cost of construction works, recycling of materials such as rubble, maintenance and security of bridges. As a result, these topics about real life problems have motivated students to do more analysis and deep discussion rather than those topics from unreal problems.

During the discussion in the classroom, we raise open questions and we let some volunteers to answer the questions or we indicate one student to answer the question. I usually give scenarios such as let us suppose that a bridge under a river was damage during the floods so what you should do to avoid the collapse of the bridge. In this case, I ask students to give their opinions individually and at the end I summarise all contributions from students and I analyse what it is near the feasible solution. Then I can speak of various aspects of the problem solution practicability. However, we sometimes raise a question for student to discuss in self-study and they present their work in the following lecture for discussion.

I have formulated research questions or hypotheses for tutoring students in their licenciatura dissertations. In this case, I formulate the main objects of the assignment

and I produce an index to show the student what he/she should do in order to reach the goal. Meanwhile, when students develop their assignments and understand the subject matter, they may improve the index that was provided by the lecturer previously.

The assessment of students on problem solution is more concerned with qualitative analysis. For example, I can challenge students with an activity that consists of construction of a bridge in a reduced scale using spaghetti as a project of the discipline. In this case, this kind of project aims to stimulate students' creativity and bring new functional solutions in which there is establishment of a set of rules and formulas as well as regulation related to weight, resistance and aesthetics of the bridge.

Variable 4: Research-led

My students have presented some assignments in the discipline during lectures and the aim of these assignments is to integrate current and updated concepts since there are unchangeable basic concepts with new developments at the level of solution in the area of construction for project designs, tools for analysis and calculation for students' awareness. In addition, we have provided much information about case studies and proceedings. Furthermore, we have updated our basic manual which precedes another one updated with case studies of construction works that we discuss some in the classroom or we give them to students as homework and in the following lectures the students present their homework, thus this motivates students to do more research.

At the level of the discipline, I supply proceedings or I recommend literature from internet for students to read, but few students are interested in this literature.

In spite of our discipline having one theoretical component and other calculation component, the former is not given a value due to poor reading during the course, yet the theoretical knowledge is the basis for problem solving. Therefore, we insist our students on knowing theories first since from this they can find out methodology. In this context, we usually give value to students who follow methods appropriately

although they have obtained a wrong result. However, the programme is very compact and intensive, consequently there is no space for analysis of research methods or research findings in the discipline.

In the discipline with a project, I have provided models of projects concerning with real structures such as a sample of a real project. For instance, I have provided students a sample of a real project of the Maputo Catembe Bridge. I would like to emphasise that the project of the discipline is an academic project in which the time available for its development is four months, but this time is not enough to produce similar contents to real project. In this case, the sample of the real projects may be used as a reference or an idea how to do the project of the discipline or future projects in the professional life.

I think that it is a good to use the research already done as models for students to do research as students in general do not like to do research perhaps it is because we study in order to be assessed. For instance, students study near the date of a test or exam and after that they keep the books and they progress in this way. As a consequence, students have difficult when we raise issues from the previous year so this reveals that they do not do long life learning. Moreover, students have difficulties in doing their assignments so the lecturer should provide them input and some of the input can be a model of the research already produced for students to see how things are done in a research project.

Students have written tests and examinations with theoretical and practical components. Likewise, students have done supplementary oral tests in order to increase low marks that they may have during the semester.

In spite of the curriculum having conditions for research, I think that it is not enough because at the beginning of the course, the learning skills are not covered, consequently students do not know how to study. In this context, I think that there should be some methods of teaching that can help students organise their academic life in order to achieve the goals in an appropriate way.

I think that motivation of lecturers associated with the lack of time from the lecturers

and commitment can be one of the factors that cause students not to conduct research. Furthermore, the curriculum of civil engineering is squeezed, as a result students are only committed to the curriculum subjects available and running in a semester. At the same time, students have many curriculum subjects to attend including those which they have failed as well as academic projects and these projects are large and they are undertaken in groups. Consequently, students do not have time to conduct research.

Apendice H: Entrevistas para docentes sobre a ligação do ensino e pesquisa no Curso de Engenharia Civil-UEM

Sou estudante do Curso de Mestrado em Estudos do Ensino Superior e Desenvolvimento da Faculdade de Educação na UEM e estou a desenvolver um projecto de dissertação do tema intitulado "A Integração do Ensino e a Pesquisa nos Currícula do Ensino Superior", o Estudo de Caso da UEM. Esta entrevista destina-se para docentes do Curso de Engenharia Civil da Faculdade de Egenharia na UEM. O propósito desta entrevista é de perceber como é que o docente integra o ensino e a pesquisa através de desenhos curriculares e práticas de ensino no curso que lecciona. A entrevista está dividida em quatro questões principais com as suas respectivas perguntas que têm como ojectivo de conhecer as actividades de aprendizagem, formas de interação, e avaliação que o docente usa para integrar o ensino e a pesquisa. Ao mesmo tempo, a entrevista tem como objectivo de perceber as experiências, sensações ou pontos de vista do docente sobre a integração do ensino e a pesquisa no ensino superior. A entrevista terá a duração de aproximadamente 40 minutos. As suas respostas vão ajudar-nos analisar a efectividade de currícula, métodos e as práticas de ensino que os docentes usam para integrar o ensino e a pesquisa no ensino superior. Porém, as suas respostas serão mantidas confidenciais e os resultados serão usados para os fins de pesquisa somente.

Guião de entrevista

1) **Ensino e aprendizagem em forma de pesquisa (currículo baseado em pesquisa)**

a) Tem realizado projectos de pesquisa com os seu estudantes de licenciatura? Em caso afirmativo positivo, por favor descreva os projectos de pesquisa que já realizou com os seus estudantes de licenciatura?

b) Os seus estudantes realizam entrevistas ou observações de campo durante o curso? Em caso afirmativo positivo, dê exemplos de entrevistas ou observações de campo que os seus estudantes já realizaram?

c) Os seus estudantes têm dado assistência aos projectos de pesquisa dos seus docentes durante o curso? Em caso afirmativo positivo, por favor informe a assistência que os seus estudantes têm dado aos projectos de pesquisa dos seus

docentes.

d) Tem avaliado os seus estudantes em elaboração ou apresentação de projectos de pesquisa durante o curso? Em caso afirmativo positivo, por favor informe os critérios que tem usado para a avaliação de projectos de pesquisa dos seus estudantes.

e) Tem avaliado os seus estudantes em realização de entrevista ou observações de campo durante o curso? Em caso afirmativo positivo, por favor informe os critérios que tem usado para a avaliação de entrevistas ou observações de campo realizadas pelos seus estudantes.

2) Envolvimento de estudantes em discussões sobre pesquisa (currículo baseado em discussão sobre pesquisa)

a) Os seus estudantes têm apresentado trabalhos académicos (e.g. ensaios académicos) para a discussão na sala de aulas? Em caso afirmativo positivo, por favor informe como é que a apresentação e discussão são feitas.

b) Tem dado temas aos seus estudantes para escrever sobre a sua assistência como docente e tutor (supervisor) ou sobre a assistência doutros docentes como tutores dentro ou fora do curso que lecciona? Em caso afirmativo positivo, quantas vezes por semana ou mês os docentes encontram-se com os seus estudantes para supervisão de ensaios académicos?

c) Tem fornecido aos seus estudantes uma bibliografia obrigatória a fim de ler e depois elaborar ensaios académicos? Em caso afirmativo positivo, por favor informe se a bibliografia obrigatória que fornece aos seus estudantes é relacionada com a matéria da disciplina/módulo que lecciona somente ou outras disciplinas/módulos.

d) Tem recomendado aos seus estudantes literatura para ler a fim de produzir ensaios académicos? Em caso afirmativo positivo, por favor informe se a literatura recomendada é relacionada com com a matéria da disciplina/módulo que lecciona somente ou outras disciplinas/módulos.

e) Os seus estudantes têm tutorado (supervisionado) trabalhos académicos (e.g. ensaios) doutros estudantes? Em caso afirmativo positivo, por favor informe como é que a tutoria (supervisão) entre estudantes é feita.

f) Ensina os seus estudantes como fazer a revisão crítica da literature? Em caso

afirmativo positivo, por favor informe o que os seus estudantes devem dominar na revisão crítica da literatura.

g) Tem avaliado os seus estudantes em elaboração de ensaios académicos durante ou no final do semester? Em caso afirmativo positivo, quais são os critérios que usa para avaliar os ensaios académicos dos seus estudantes?

h) Tem avaliado os seus estudantes em apresentação oral de ensaios académicos durante ou no final do semester? Em caso afirmativo positivo, quais são os critérios que usa para avaliar a apresentação oral dos ensaios académicos dos seus estudantes?

3. Desenvolvimento das habilidades e técnicas de pesquisa (currículo com orientação de pesquisa)

a) Tem criado cenários ou situações sobre problemas da vida real da disciplina que lecciona papa os estudantes discutirem? Em caso afirmativo positivo, por favor informe como é que é a discussão de problemas da vida real da disciplina é feita na sala de aulas?

b) Tem formulado perguntas de pesquisa ou hipóteses para os seus estudantes realizarem pesquisa? Em caso afirmativo positivo, por favor dê exemplos de perguntas ou hipóteses que já formulou para os estudantes fazerem pesquisa ?

c) Tem avaliado os seus estudantes em resolução de problemas durante ou no final do semestre? Em caso afirmativo positivo, por favor informe como é que avalia os seus estudantes em resolução de problemas?

d) Tem formulado perguntas de pesquisa ou hipóteses para os estudantes darem possíveis respostas ou explicação como forma de avaliação durante ou no final de semestre? Em caso afirmativo positivo, por favor informe como é que avalia os seus estudantes através de perguntas de pesquisa ou hipóteses.

4. Aprendizagem sobre pesquisas feitas por outros (currículo da pesquisa direcionada)

a) Os seus estudantes têm analisado metodologias de investigação ou conclusões de pesquisas já realizadas ao nível da disciplina? Em caso afirmativo positivo, por favor informe o que os seus estudantes têm analisado nas metodologias de investigação ou conclusões das pesquisas já realizadas?

b) Tem dado apresentações sobre pesquisas recentes dentro da disciplina durante

as aulas? Em caso afimativo positivo, Por favor informe o seu objectivo central de apresentar pesquisas recentes dentro da disciplina que lecciona?

c) Têm usado pesquisas já feitas (e.g. dissertações ou teses) como modelos para os seus estudantes aprenderem como fazer pesquisa? Em caso afirmativo positivo, qual é o seu sentimento sobre o uso de pesquisas já feitas (e.g. dissertações ou teses) como modelos para os seus estudantes aprenderem como fazer pesquisa?
d) Por favor mencione tipos de testes ou exames que tem dado aos seus estudantes durante ou no final do semestre.
e) Por favor mencione tipos de trabalhos académicos que os seus esudantes realizam durante ou no final do semestre.
f) Segundo as suas experiências ao longo do curso de licenciatura que lecciona , acha que os estudantes realizam pesquisa? Porquê/porquê não?

Muito obrigado pelo seu tempo dispensado!

Appendix I: Documentary analysis (curriculum analysis) about teaching and research linkages in the EELC of the Faculty of Education-UEM

Type of the curriculum	Skills focused	Learning activities or tasks	Patterns of interaction recommended or implied	Role of the student	Role of the lecturer	Assessment activities
Research-based curriculum	Research-skills	Research projects and fieldwork	Pair work or group work	Enquirer or researcher	Learner or facilitator	Producing and/or presenting research projects
Research-tutored curriculum	Research analysis and discussion	Essays or papers, reading and writing, presentation and discussion of essays or papers.	Pair work or group work	Analyst	Tutor or advisor	Writing or presentation of essays or papers
Research-oriented curriculum	Learning research skills and techniques	Problem solving	Individual and group work	Problem solver	Initiator and participant	Scenarios or situations for problem solving
Research-led curriculum	Conceptual learning of the discipline	Lectures and coursework	Individual work	Knowledge recipient	Source of knowledge	Written/oral tests or exams, course assignments

Table 6: Curriculum discourse of the EELC of the Faculty of Education-UEM

	Variable 1: Research-based
Skills	Undergraduate students should have research skills in the area of environment and promote production of knowledge as well as sustainable development of environmental practices. At the same time, the undergraduate students should have skills of investigating the rational use of resources. Moreover, the students should conduct research about environmental problems. Thus, they should have spirit of enquiring, adaptability, innovating and investigating.
Teaching-learning methods	The teaching-learning methods are centred on the student. These methods include active participation of the student and critical thinking and the student is an agent of intervention and change through his/her curiosity, creativity, and autonomy during the teaching and learning process.
Teaching-learningactivities	Undergraduate students should undertake teaching-learning activities that consist of individual and group research projects and self-study based on research. Likewise, the undergraduate students should produce monographs at the end of the course involving, for example, a case study or literature review.
Assessment	The assessment is based on research projects throughout the course and production of monographs at the end of the course.

	Variable 2: Research-tutored
Skills	Undergraduate students should be able to conceptualise, monitor, assess and manage projects and programmes in the area of environmental education for sustainable development and they should be able to advise communities and decision making organs in environmental education matters as well as critical conceptualisation of the legislation and policies about the relation among society, education and environment.
Teaching-learning methods	The teaching-learning methods are centred on the student. These methods include active participation of the student and critical thinking and the student is an agent of intervention and change through his/her curiosity, creativity and autonomy during the teaching learning process.
Teaching-learning activities	The undergraduate students should undertake teaching-learning activities consisting of tutorial groups, workshops, essays, seminars, case study analysis, directed reading, home assignments, tutoring and 'jornadas científicas'. Meanwhile, in these activities, students are expected to be autonomous, cooperative and work in groups for sharing experience.
Assessment	Assessment involves discussion of reports in groups/tutorial groups, self-study assignment and qualitative assignment on participation of the student in lectures as well as assessment of academic writing, individual and group presentation of assignments and peer review monitored by the lecturer. Furthermore, the assessment includes qualitative assessment of generic skills, presentation of the fieldwork reports and supervision of monographs.

	Variable 3: Research-oriented
kills	Undergraduate students should have skills of know-how, that is, abilities to do the activities and real tasks in the professional area for education, preservation and maintenance of the environment. In this context, students should be able to apply the environmental legislation as well as application of basic concepts in analysis and resolution of problems. Likewise, students should have generic skills as necessary capacity in all content domains for new professional situations in or out of the profession. At last, undergraduate students should master leadership skills and they should be aware of the environmental value and problems.
Teaching-learning methods	Teaching-learning methods are centred on the individual as a flexible professional that is supposed to provide answers to situations and new problems so the individual should master research methods and techniques used for social and professional investigation. In this way, knowledge is regarded as a tool for carrying professional activities.
Teaching-learning activities	Teaching-learning activities include problem solving, simulation, production of environmental visual aids to support environmental training, internships and reports at the end of the course. In this context, internships help to develop know-how skills and ethics in the professional area of training and meet with experienced professionals who transmit practical relevant experience. Meanwhile, training in environmental education should develop students' interaction and understanding of Mozambican reality for a proactive action and change.
Assessment	The assessment is done to measure skills of know-how in environmental problem solving through education. For example, the design of education environmental materials for school curricula.

	Variable 4: Research-led
Skills	Undergraduate students should develop know-what skills that reflect in content learning so they should master basic concepts of environmental education and process of human development. Likewise, the undergraduate students should develop know-what skills that reflect in content learning, thus they should master legislation, regulations, and policies about environment.
Teaching-learning methods	The teaching-learning methods are centred on the lecturer and the role of the lecturer is to give students information.
Teaching-learning activities	The teaching-learning activities involve expositive lecturers in a direct contact with the lecturer.
Assessment	The assessment consists of written tests and exams, quantitative assessment, portfolio observation. In this case, the assessment aims to provide information to students about a teaching-learning process so the assessment has a didactic function for measuring students' knowledge acquired in a unit or topic. In this case, the assessment aims to provide information to students about the teaching-learning process so the assessment has a didactic function for measuring students' knowledge acquired in a unit or topic that has been taught. Similarly, the assessment aims to understand to what extent the students are skilful at knowledge taught.

Appendix J: Documentary analysis (curriculum analysis) about teaching and research linkages in the CELC of the Faculty of Engineering-UEM

Type of the curriculum	**Skills focused**	**Learning activities or tasks**	**Patterns of interaction recommended or implied**	**Role of the student**	**Role of the lecturer**	**Assessment activities**
Research-based curriculum	Research-skills	Research projects and fieldwork	Pair work or group work	Enquirer or researcher	learner or facilitator	producing and/or presenting research projects
Research-tutored curriculum	research analysis and discussion	Essays or papers, reading and writing, presentation and discussion of essays or papers.	Pair work or group work	Analyst	Tutor or advisor	Writing or presentation of essays or papers
Research-oriented curriculum	Learning research skills and techniques	Problem solving	Individual and group work	problem solver	Initiator and participant	Scenarios or situations for problem solving
Research-led curriculum	Conceptual learning of the discipline	Lectures and coursework	Individual work	Knowledge recepient	Source of knowledge	Written/oral tests or exams, course assignments

Table 7: Curriculum discourse of the CELC of the Faculty of Engineering-UEM

	Variable 1: Research-based
Skills	Undergraduate students should be able to conduct studies, projects and investigation.
Teaching-learning methods	No description of teaching-learning methods.
Teaching-learning activities	Undergraduate students should undertake teaching-learning activities that consist of course projects including integrative knowledge from different disciplines for real problem solving.
Assessment	The assessment involves the development and presentation of course projects.

	Variable 2: Research-tutored
Skills	Undergraduate students in the civil engineering should be able to develop and present reports from laboratory activities or essays.
Teaching-Learning methods	No description of teaching-learning methods.
Teaching-learning activities	Teaching-learning activities consist of group work for project studies, construction, use and maintenance of construction works.
Assessment	The assessment includes development and presentation of laboratory or essay reports.

	Variable 3: Research-oriented
Skills	The civil engineering course at UEM aims to train civil engineers at university level with scientific and general knowledge in traditional domains of civil engineering. In this view, undergraduate students should be able to: supervise and control construction works; master the process of soil characterisation and research methods; master calculation, design and analysis of construction works; have knowledge of environmental problems associated with civil construction works such as bridges, roads, water supply and sewage, retention of soil and small dams; have knowledge in the organisation process for development of construction works according to the legislation, environment security as well as contractual procedures and the process of construction and security.
Teaching-learning methods	Teaching-learning methods involve lecturers in the discipline aimed to develop students' abilities and attitudes for professional skills in the civil engineering field. In this context, the disciplines of specialisation introduce knowledge directed to application. At the same time, the learning and teaching methods include the development of projects in the discipline as well as internships for specialisation.
Teaching-learning activities	Teaching-learning activities involve lecturing of the end of the course disciplines as well as professional internships.
Assessment	Assessment consists of development and presentation of projects in the discipline and internship reports.

	Variable 4: Research-led
Skills	Undergraduate students in the civil engineering should have scientific knowledge in the discipline of mathematics and physics. For instance, the students should master the rules of graphical representation, physical and chemical properties of construction materials. In addition, the undergraduate students should master the legislation and general rules for development of construction projects. Moreover, students should have basic knowledge of economics and management of enterprises and keep updated with technical and scientific developments in the area of civil construction.
Teaching-learning methods	Teaching-learning methods are centred on the lecturer and the role of the lecturer is to give students lectures and information.
Teaching-learning activities	The process of teaching and learning involves theoretical, practical and laboratory lectures.
Assessment	The assessment consists of tests and exams.

Appendix K: Items for observation of a year four stream about research-teaching linkages in the EELC of the Faculty of Education-UEM

Items for observation during lectures	1. Very good	2. Good	3. Fair	4. Poor	5. Very poor	6.Not Applicable
1. Student as active participant (student-centred method to teaching)						
1.1 interactions between students in groups to discuss knowledge or ideas.						
1.2 Interaction between students in pairs to discuss knowledge or ideas.						
1.3 Interaction between students in groups for presentation of assignments.						
1.4 Interaction between students in pairs for presentation of assignments.						
2. Role of the lecturer and student						
2.1 Students discuss knowledge or idea loosely guided by the lecturer.						
2.2 Students give feedback.						
2.3 The lecturer provides feedback when it is needed.						

3. Students as passive participants (Teacher-centred method or information transmission method)						
3.1 Students work individually to answer questions or explain hypotheses framed by the lecturer.						
3.2 Students work individually to solve problems posed by the lecturer in the discipline.						
4. Role of the lecturer and student						
4.1 Students listen to the lecturer's presentations and take notes.						
.4.2 Students do reading individually						
4.3 Feedback given by the lecturer.						

Table 8: Observation of a year four stream in the EELC of the Faculty of Education-UEM

L1	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	III					
X4						NA
X5	II					
X6						NA
X7					I	
X8						NA
X9						NA
X10						NA
X11						NA
X12						NA

L2	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4			I	I		
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10						NA
X11						NA
X12	I				I	

L3	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	I		I			
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIII					
X11						NA
X12						NA

L4	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	II		I			
X4						NA
X5				I		
X6						NA
X7	I				I	
X8						NA
X9	IIII					
X10						NA
X11						NA
X12						NA

L5	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	II				I	
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	III					
X11						NA
X12						NA

L6	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIII	II				
X11						NA
X12						NA

L7	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIII					
X11						NA
X12						NA

L8	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIIII					
X11						NA
X12						NA

L9	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	I					
X4						NA
X5	II					
X6						NA
X7						NA
X8						NA
X9						NA
X10						NA
X11						NA
X12						NA

L10	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4					II	
X5					I	
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIII	I				
X11						NA
X12	I	I				

L11	VG	G	F	P	VP	NA
X1			II	I		
X2						
X3			II			NA
X4						NA
X5	I			I		
X6						NA
X7						NA
X8			I			
X9						NA
X10	II		III			
X11						NA
X12			I			

L12	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	III			II		
X11						NA
X12						NA

L13	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIIII					
X11						NA
X12						NA

L14	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6	III			I		
X7						NA
X8						NA
X9	I					
X10			II			
X11	II					
X12			II			

Appendix L: Items for observation of a year four stream about research and teaching linkages in the CELC of the Faculty of Engineering-UEM

Items for observation during lectures	1. Very good	2. Good	3. Fair	4. Poor	5. Very poor	6.Not Applicable
1. Students as active participants (student-centred method to teaching)						
1.1 interactions between students in groups to discuss knowledge or ideas.						
1.2 Interaction between students in pairs to discuss knowledge or ideas.						
1.3 Interaction between students in groups for presentation of assignments.						
1.4 Interaction between students in pairs for presentation of assignments.						
2. Role of the lecturer and student						

2.1 Students discuss knowledge or idea loosely guided by the lecturer.						
2.2 Students give feedback.						
2.3 The lecturer provides feedback when it is needed.						
3. Students as passive participants (Teacher-centred method or information transmission method)						
3.1 Students work individually to answer questions or explain hypotheses framed by the lecturer.						
3.2 Students work individually to solve problems posed by the lecturer in the discipline.						
4. Role of the lecturer and student						
4.1 Students listen to the lecturer's presentations and take notes.						
4.2 Students do reading individually						
4.3 Feedback given by the lecturer.						

Table 9: Observation of a year four stream in the CELC of the Faculty of Engineering-UEM

L1	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9	II	II	I	IIII		
X10	III					
X11						NA
X12	I	I				

L2	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8		I		II		
X9		II				
X10		I				
X11						NA
X12						NA

L3	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8	IIII	I				
X9						NA
X10	II	I		III		
X11						NA
X12						NA

L4	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9			I			
X10	IIIII	I				
X11						NA
X12						NA

L5	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIIII					
X11						NA
X12						NA

L6	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10		IIIII	I		I	
X11						NA
X12						NA

L7	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9			IIIII		II	
X10	IIII	I				
X11						NA
X12						NA

L8	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9	I	I				
X10	III			I		
X11						NA
X12	II					

L9	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIII	I				
X11						NA
X12						NA

L10	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4					II	
X5					I	
X6						NA
X7						NA
X8						NA
X9						NA
X10		IIIII				
X11						NA
X12	I	I				

L11	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9			I	III		
X10						NA
X11	IIII	III				
X12						NA

L12	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIII					
X11						NA
X12						NA

L13	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3						NA
X4						NA
X5						NA
X6						NA
X7						NA
X8						NA
X9						NA
X10	IIIIIII					
X11						NA
X12						NA

L14	VG	G	F	P	VP	NA
X1						NA
X2						NA
X3	III		I	I		
X4						NA
X5	I		I			
X6						NA
X7			I			
X8						NA
X9						NA
X10						NA
X11						NA
X12	III					

Appendix M: Questionnaire for students about research and teaching linkages in the EELC of the Faculty of Education-UEM

I am a master student from Higher Education Studies and Development Course in the Faculty of Education at UEM and I am working on my dissertation project. The topic of the dissertation project is entitled 'Research-teaching nexus in Mozambican Higher Education Curricula', the case study of UEM. I have designed this questionnaire for licenciatura students in the Environmental Education Course of the Faculty of Education at UEM. The questionnaire is divided into four parts and each part has different statements related to the integration of research and teaching in higher education. The aim of this questionnaire is to obtain your feelings, perceptions, or practices concerning with the integration of teaching and research throughout your licenciatura course. This questionnaire should be completed within 10 days from now (the date of submission). Your answers will help us to analyse the effectiveness of curriculum designs and teaching practices used by the teaching staff in your field to link research and teaching in higher education. Your responses will be kept strictly confidential and the results will be used for research purpose only. Please read carefully the questionnaire and circle each statement which best expresses how you feel or think about the integration of research and teaching throughout your licenciatura course. Use the rating scale from the box below.

Strongly agree	Agree	Neither agree Nor disagree	Disagree	Strongly disagree
1	2	3	4	5

1. Learning how to do research and doing research

1.1 The learning activities used during your licenciatura course help you to:					
1.1.1 Conduct individual research-projects.	1	2	3	4	5
1.1.2 Conduct group research-projects.	1	2	3	4	5
1.1.3 Conduct interview in the field for research projects.	1	2	3	4	5
1.1.4 Conduct observation in the field for research projects.	1	2	3	4	5

1.1.5 Do research together with your lecturers.	1	2	3	4	5
1.1.6 Colect/analyse data for you lecturers' research.	1	2	3	4	5
1.2 Assessment on knowledge construction					
1.2.1 You are assessed on research projects during or at the end of a semester.	1	2	3	4	5
1.2.2 You are assessed on fieldwork research during or at the end of a semester.	1	2	3	4	5

2. Learning about research process

2.1. Reading, writing and presentation of academic essays or papers					
2.1.1 You do recommended reading by your lecturer(s) in order to produce academic essays or papers during your course.	1	2	3	4	5
2.1.2 You are assigned writing topics with a tutor (supervisor) from your course or a tutor from outside your course.	1	2	3	4	5
2.1.3 You write academic essays or papers in pairs or groups assisted by your lecturer or tutor.	1	2	3	4	5
2.1.4 You produce academic essays or papers based on bibliographical guidance provided by the lecturer.	1	2	3	4	5
2.1.5 You meet individually or in groups with your lecturer/ tutor once a week/month for tutorials of essay or paper writing.	1	2	3	4	5
2.2. Involvement in discussion or critical analysis of academic essays or papers					
2.2.1 You present academic essays or papers individually for class discussion.	1	2	3	4	5
2.2.2 You present academic essays or papers in pairs or groups for class discussion.	1	2	3	4	5
2.2.3 You do critical analysis of academic essays or papers.	1	2	3	4	5
2.2.4 You do tutoring (supervising) of your fellow students' academic essays or papers.	1	2	3	4	5
2.2.5. You do literature review and critique.	1	2	3	4	5
2.3 Assessment on research process					
2.3.1 You are assessed on writing of academic essays or papers.	1	2	3	4	5
2.3.2 You assessed on oral presentation of academic essays or papers.	1	2	3	4	5

2.3.3 You assessed on tutoring (supervising) of your fellow students' academic essays or papers.	1	2	3	4	5
2.3.4 You are assessed on lierature review and critique.	1	2	3	4	5

3. Knowledge construction in the discipline

3.1 You learn to construct knowledge in your discipline through problem based learning					
3.1.1 Your lecturers provide scenarios or situations of real life problems in your area of the study for students to discuss and find possible solutions or decisions.	1	2	3	4	5
3.1.2 Your lecturers formulate their own questions or hypotheses for students to do research.	1	2	3	4	5
3.2 Assessment on problem solving					
3.2.1 You are assessed on solving problems in the area of the study during or at the end of a semester.	1	2	3	4	5
3.2.2 During or at the end of a semester you are assessed on answering questions or explaining hypotheses framed by your lecturers.	1	2	3	4	5

4. Research-informed learning

4.1 Learning about others' research					
4.1.1 You analyse methodologies or research findings of the studies already conducted in the discipline.	1	2	3	4	5
4.1.2 You use dissertations or theses that have already been produced as models for doing research.	1	2	3	4	5
4.1.3. Your lecturers present current research in the discipline.	1	2	3	4	5
4.1.3 You do laboratory activities.	1	2	3	4	5
4.2 Assessment on learning about other's research					
4.2.1 You do written tests or examinations during or at the end of a semester or year.	1	2	3	4	5
4.2.2 You write or present assignments at the end of a course.	1	2	3	4	5

Thank you for your time!

Apendice N: Questionário para estudantes sobre a integração do ensino e a pesquisa no Curso de Educação Ambiental da Faculdade de Educação-UEM

Sou estudante do Curso de Mestrado em Estudos do Ensino Superior e Desenvolvimento da Faculdade de Educação na UEM e estou a desenvolver um projecto de dissertação do tema intitulado "A Integração do Ensino e a Pesquisa nos Currícula do Ensino Superior", o Estudo de Caso da UEM. Este questionário destina-se para estudantes do Curso de Licenciatura em Educação Ambiental da Faculdade de Educação na UEM. O questionário está dividido em quatro partes. Cada parte contém diferentes itens sobre a integração do ensino e a pesquisa no ensino superior e têm como objectivo de obter o seu sentimento, percepção ou práticas em relação à integração do ensino e a pesquisa ao longo do seu curso de licenciatura. O questionário deve ser respondido num prazo de 10 dias apartir da data da sua entrega. As suas respostas ajudarão-nos analisar a efectividade dos desenhos curriculares, métodos e práticas de ensino que os docentes usam para integrar o ensino e a pesquisa durante o processo de aprendizagem. Porém, as suas respostas serão mantidas confidenciais e os resultados serão usados para efeitos de pesquisa somente. Por favor leia atentamente o questionário e ponha um círculo na afirmação que melhor expressa o seu sentimento, pensamento ou práticas sobre a integração do ensino e a pesquisa ao longo do seu curso de licentura. Use a escala indicada no rectângulo que se segue.

Concordo totalmente	Concordo	Nem concordo Nem discordo	Não concordo	Não concordo totalmente
1	2	3	4	5

1. Aprender como fazer pesquisa e realizar pesquisa

1.1 As actividades em uso durante o seu curso de licenciatura ajudam-lhe fazer o seguinte:					
1.1.1 Realizar projectos individuais de pesquisa .	1	2	3	4	5
1.1.2 realizar projectos de pesquisa em groups.	1	2	3	4	5
1.1.3 Fazer entrevistas como trabalho de campo para projectos de pesquisa.	1	2	3	4	5

1.1.4 Realizar observações como trabalho de campo para projectos de pesquisa.	1	2	3	4	5
1.1. 5 Fazer pesquisa conjuntamente com os docentes.	1	2	3	4	5
1.1.6 Colectar ou analisar dados para a pesquisa do corpo docente.	1	2	3	4	5
1.2 Avaliação sobre a construção do conhecimento					
1.2.1 É avaliado sobre projectos de pesquisa durante ou no final do semestre.	1	2	3	4	5
1.2.2 É avaliado por realizar pesquisa de campo durante ou no final do semestre.	1	2	3	4	5

2. **Aprendizagem sobre processos de pesquisa**

2.1. Leitura e elaboração de trabalhos académicos					
2.1.1 Tem produzido trabalhos académicos sob bibliografia recomendada pelo seu docente durante o seu curso.	1	2	3	4	5
2.1.2 Ao longo do seu curso, tem tido temas para escrever assistido por um tutor (supervisor) do seu curso ou fora do do seu curso.	1	2	3	4	5
2.1.3 Tem escrito trabalhos académicos em pares ou grupos assistido por um tutor (supervisor).	1	2	3	4	5
2.1. 4 Tem produzido trabalhos académicos na base da lista bibliográfica fornecida pelo seu docente.	1	2	3	4	5
2.1.5 Encontra-se com o seu tutor (supervisor) individualmente ou em grupos uma vez por semana ou quinzenalmente para a tutoria (supervisão) de trabalhos académicos.	1	2	3	4	5
2.1. Involvimento de estudantes na discussão ou análise crítica de trabalhos académicos					
2.2.1 Faz a apresentação individual de trabalhos académicos para discussão na sala de aulas.	1	2	3	4	5
2.2.2 Faz apresentação de trabalhos académicos em pares ou grupos para discussão na sala de aulas.	1	2	3	4	5
2.2.3 Faz análise crítica de trabalhos académicos.	1	2	3	4	5
2.2.4 Faz tutoria (supervisão) de trabalhos académicos doutros estudantes.	1	2	3	4	5
2.2.5. Faz a revisão crítica da literatura.	1	2	3	4	5

2.3 Assessment on research process					
2.3.1 You are assessed on writing of academic essays or papers.	1	2	3	4	5
2.3.2 You assessed on oral presentation of academic essays or papers.	1	2	3	4	5
2.3.3 You assessed on tutoring (supervising) of your fellow students' academic essays or papers.	1	2	3	4	5
2.3.4 You are assessed on lierature review and critique.	1	2	3	4	5

3. Knowledge construction in the discipline

3.1 You learn to construct knowledge in your discipline through problem based learning					
3.1.1 Your lecturers provide scenarios or situations of real life problems in your area of the study for students to discuss and find possible solutions or decisions.	1	2	3	4	5
3.1.2 Your lecturers formulate their own questions or hypotheses for students to do research.	1	2	3	4	5
3.2 Assessment on problem solving					
3.2.1 You are assessed on solving problems in the area of the study during or at the end of a semester.	1	2	3	4	5
3.2.2 During or at the end of a semester you are assessed on answering questions or explaining hypotheses framed by your lecturers.	1	2	3	4	5

4. Research-informed learning

4.1 Learning about others' research					
4.1.1 You analyse methodologies or research findings of the studies already conducted in the discipline.	1	2	3	4	5
4.1.2 You use dissertations or theses that have already been produced as models for doing research.	1	2	3	4	5
4.1.3. Your lecturers present current research in the discipline.	1	2	3	4	5
4.1.3 You do laboratory activities.	1	2	3	4	5
4.2 Assessment on learning about other's research					
4.2.1 You do written tests or examinations during or at the end of a semester or year.	1	2	3	4	5
4.2.2 You write or present assignments at the end of a course.	1	2	3	4	5

Thank you for your time!

Appendix O: Questionnaire for students about research and teaching linkages in the CELC of the Faculty of Engineering-UEM

I am a master student from Higher Education Studies and Development Course in the Faculty of Education at UEM and I am working on my dissertation project. The topic of the dissertation project is entitled 'Research-teaching nexus in Mozambican Higher Education Curricula', the case study of UEM. I have designed this questionnaire for licenciatura students in the Civil Engineering Course of the Faculty of Engineering at UEM. The questionnaire is divided into four parts and each part has different statements related to the integration of research and teaching in higher education. The aim of this questionnaire is to obtain your feelings, perceptions, or practices concerning with the integration of teaching and research throughout your licenciatura course. This questionnaire should be completed within 10 days from now (the date of submission). Your answers will help us to analyse the effectiveness of curriculum designs and teaching practices used by the teaching staff in your field to link research and teaching in higher education. Your responses will be kept strictly confidential and the results will be used for research purpose only. Please read carefully the questionnaire and circle each statement which best expresses how you feel or think about the integration of research and teaching throughout your licenciatura course. Use the rating scale from the box below.

Strongly agree	Agree	Neither agree Nor disagree	Disagree	Strongly disagree
1	2	3	4	5

1. Learning how to do research and doing research

1.1 The learning activities used during your licenciatura course help you to:					
1.1.1 Conduct individual research-projects.	1	2	3	4	5
1.1.2 Conduct group research-projects.	1	2	3	4	5
1.1.3 Conduct interview in the field for research projects.	1	2	3	4	5
1.1.4 Conduct observation in the field for research projects.	1	2	3	4	5

1.1.5 Do research together with your lecturers.	1	2	3	4	5
1.1.6 Colect/analyse data for you lecturers' research.	1	2	3	4	5
1.2 Assessment on knowledge construction					
1.2.1 You are assessed on research projects during or at the end of a semester.	1	2	3	4	5
1.2.2 You are assessed on fieldwork research during or at the end of a semester.	1	2	3	4	5

2. Learning about research process

2.1. Reading, writing and presentation of academic essays or papers					
2.1.1 You do recommended reading by your lecturer(s) in order to produce academic essays or papers during your course.	1	2	3	4	5
2.1.2 You are assigned writing topics with a tutor (supervisor) from your course or a tutor from outside your course.	1	2	3	4	5
2.1.3 You write academic essays or papers in pairs or groups assisted by your lecturer or tutor.	1	2	3	4	5
2.1.4 You produce academic essays or papers based on bibliographical guidance provided by the lecturer.	1	2	3	4	5
2.1.5 You meet individually or in groups with your lecturer/ tutor once a week/month for tutorials of essay or paper writing.	1	2	3	4	5
2.2. Involvement in discussion or critical analysis of academic essays or papers					
2.2.1 You present academic essays or papers individually for class discussion.	1	2	3	4	5
2.2.2 You present academic essays or papers in pairs or groups for class discussion.	1	2	3	4	5
2.2.3 You do critical analysis of academic essays or papers.	1	2	3	4	5
2.2.4 You do tutoring (supervising) of your fellow students' academic essays or papers.	1	2	3	4	5
2.2.5. You do literature review and critique.	1	2	3	4	5
2.3 Assessment on research process					
2.3.1 You are assessed on writing of academic essays or papers.	1	2	3	4	5
2.3.2 You assessed on oral presentation of academic essays or papers.	1	2	3	4	5

2.3.3 You assessed on tutoring (supervising) of your fellow students' academic essays or papers.	1	2	3	4	5
2.3.4 You are assessed on lierature review and critique.	1	2	3	4	5

3. Knowledge construction in the discipline

3.1 You learn to construct knowledge in your discipline through problem based learning					
3.1.1 Your lecturers provide scenarios or situations of real life problems in your area of the study for students to discuss and find possible solutions or decisions.	1	2	3	4	5
3.1.2 Your lecturers formulate their own questions or hypotheses for students to do research.	1	2	3	4	5
3.2 Assessment on problem solving					
3.2.1 You are assessed on solving problems in the area of the study during or at the end of a semester.	1	2	3	4	5
3.2.2 During or at the end of a semester you are assessed on answering questions or explaining hypotheses framed by your lecturers.	1	2	3	4	5

4. Research-informed learning

4.1 Learning about others' research					
4.1.1 You analyse methodologies or research findings of the studies already conducted in the discipline.	1	2	3	4	5
4.1.2 You use dissertations or theses that have already been produced as models for doing research.	1	2	3	4	5
4.1.3. Your lecturers present current research in the discipline.	1	2	3	4	5
4.1.3 You do laboratory activities.	1	2	3	4	5
4.2 Assessment on learning about other's research					
4.2.1 You do written tests or examinations during or at the end of a semester or year.	1	2	3	4	5
4.2.2 You write or present assignments at the end of a course.	1	2	3	4	5

Thank you for your time!

Apendice P: Questionário para estudantes sobre a integração do ensino e a peaquisa no Curso de Engenharia Civil da Faculdade de Engenharia-UEM

Sou estudante do Curso de Mestrado em Estudos do Ensino Superior e Desenvolvimento da Faculdade de Educação na UEM e estou a desenvolver um projecto de dissertação do tema intitulado "A Integração do Ensino e a Pesquisa nos Currícula do Ensino Superior", o Estudo de Caso da UEM. Este questionário destina-se para estudantes do Curso de Licenciatura em Engenharia Civil da Faculdade de Engenharia na UEM. O questionário está dividido em quatro partes e cada parte contém diferentes itens sobre a integração do ensino e a pesquisa no ensino superior e têm como objectivo de obter o seu sentimento, percepção ou práticas em relação à integração do ensino e a pesquisa ao longo do seu curso de licenciatura. O questionário deve ser respondido num prazo de 10 dias apartir da data da sua entrega. As suas respostas ajudarão-nos analisar a efectividade dos desenhos curriculares, métodos e práticas de ensino que os docentes usam para integrar o ensino e a pesquisa durante o processo de aprendizagem. Porém, as suas respostas serão mantidas confidenciais e os resultados serão usados para efeitos de pesquisa somente. Por favor leia atentamente o questionário e ponha um círculo na afirmação que melhor expressa o seu sentimento, pensamento ou práticas sobre a integração do ensino e a pesquisa ao longo do seu curso de licentura. Use a escala no rectângulo que se segue.

Concordo totalmente	Concordo	Nem concordo Nem discordo	Não concordo	Não concordo totalmente
1	2	3	4	5

1. Learning how to do research and doing research

1.1 The learning activities used during your licenciatura course help you to:					
1.1.1 Conduct individual research-projects.	1	2	3	4	5
1.1.2 Conduct group research-projects.	1	2	3	4	5
1.1.3 Conduct interview in the field for research projects.	1	2	3	4	5

1.1.4 Conduct observation in the field for research projects.	1	2	3	4	5
1.1.5 Do research together with your lecturers.	1	2	3	4	5
1.1.6 Colect/analyse data for you lecturers' research.	1	2	3	4	5
1.2 Assessment on knowledge construction					
1.2.1 You are assessed on research projects during or at the end of a semester.	1	2	3	4	5
1.2.2 You are assessed on fieldwork research during or at the end of a semester.	1	2	3	4	5

2. Learning about research process

2.1. Reading, writing and presentation of academic essays or papers					
2.1.1 You do recommended reading by your lecturer(s) in order to produce academic essays or papers during your course.	1	2	3	4	5
2.1.2 You are assigned writing topics with a tutor (supervisor) from your course or a tutor from outside your course.	1	2	3	4	5
2.1.3 You write academic essays or papers in pairs or groups assisted by your lecturer or tutor.	1	2	3	4	5
2.1.4 You produce academic essays or papers based on bibliographical guidance provided by the lecturer.	1	2	3	4	5
2.1.5 You meet individually or in groups with your lecturer/ tutor once a week/month for tutorials of essay or paper writing.	1	2	3	4	5
2.2. Involvement in discussion or critical analysis of academic essays or papers					
2.2.1 You present academic essays or papers individually for class discussion.	1	2	3	4	5
2.2.2 You present academic essays or papers in pairs or groups for class discussion.	1	2	3	4	5
2.2.3 You do critical analysis of academic essays or papers.	1	2	3	4	5
2.2.4 You do tutoring (supervising) of your fellow students' academic essays or papers.	1	2	3	4	5
2.2.5. You do literature review and critique.	1	2	3	4	5

2.3 Assessment on research process					
2.3.1 You are assessed on writing of academic essays or papers.	1	2	3	4	5
2.3.2 You assessed on oral presentation of academic essays or papers.	1	2	3	4	5
2.3.3 You assessed on tutoring (supervising) of your fellow students' academic essays or papers.	1	2	3	4	5
2.3.4 You are assessed on lierature review and critique.	1	2	3	4	5

3. Knowledge construction in the discipline

3.1 You learn to construct knowledge in your discipline through problem based learning					
3.1.1 Your lecturers provide scenarios or situations of real life problems in your area of the study for students to discuss and find possible solutions or decisions.	1	2	3	4	5
3.1.2 Your lecturers formulate their own questions or hypotheses for students to do research.	1	2	3	4	5
3.2 Assessment on problem solving					
3.2.1 You are assessed on solving problems in the area of the study during or at the end of a semester.	1	2	3	4	5
3.2.2 During or at the end of a semester you are assessed on answering questions or explaining hypotheses framed by your lecturers.	1	2	3	4	5

4. Research-informed learning

4.1 Learning about others' research					
4.1.1 You analyse methodologies or research findings of the studies already conducted in the discipline.	1	2	3	4	5
4.1.2 You use dissertations or theses that have already been produced as models for doing research.	1	2	3	4	5
4.1.3. Your lecturers present current research in the discipline.	1	2	3	4	5
4.1.3 You do laboratory activities.	1	2	3	4	5
4.2 Assessment on learning about other's research					
4.2.1 You do written tests or examinations during or at the end of a semester or year.	1	2	3	4	5
4.2.2 You write or present assignments at the end of a course.	1	2	3	4	5

Thank you for your time!

Appendix Q: Questionnaire for lecturers about research and teaching linkages in the EELC of the Faculty of Education-UEM

I am a master student from Higher Education Studies and Development Course in the Faculty of Education at UEM and I am working on my dissertation project. The topic of the dissertation project is entitled 'Research-teaching nexus in Mozambican Higher Education Curricula', the case study of UEM. I have designed this questionnaire for the lecturers in the Environmental Education Licenciatura Course of the Faculty of Education at UEM. The questionnaire is divided into four parts and each part has different statements related to the integration of research and teaching in higher education. The aim of this questionnaire is to obtain your feelings, perceptions, beliefs and teaching practices in attempt to bring teaching and research together in the course that you lecture. This questionnaire should be completed within 10 days from now (the date of submission). Your answers will help us to analyse the effectiveness of curriculum designs and teaching practices used by the lecturers to link teaching and research in higher education. The responses will be kept strictly confidential and the results will be used for research purpose only. Please read carefully the questionnaire and circle each statement which best expresses how you feel or think about the integration of research and teaching throughout the licenciatura course that you lecture. Use the rating scale from the box below.

Strongly agree	Agree	Neither agree Nor disagree	Disagree	Strongly disagree
1	2	3	4	5

1. Students learn how to do research and they are researchers

1.1 The use of research activities in the undergraduate licenciatura course you lecture foster students to:					
1.1.1 Conduct individual research projects.	1	2	3	4	5
1.1.2 Conduct group research projects.	1	2	3	4	5
1.1.3 Conduct interview in the field for research projects.	1	2	3	4	5

1.1.4 Conduct observation in the field for research projects.	1	2	3	4	5
1.1.5 Assist the lecturers' research in the course level, department/faculty level.	1	2	3	4	5
1.1.6 Colect/analyse data for lecturers' research.	1	2	3	4	5
1.2 Assessment on knowledge construction					
1.2.1 You assess your students on research projects during or at the end of a semester.	1	2	3	4	5
1.2.2 You assess your students on fieldwork research during or at the end of a semester.	1	2	3	4	5

2. Students learn research process

2.1. Reading and writing of academic essays or papers					
2.1.1 You recommend bibliography for your students to read and produce academic essays or papers.	1	2	3	4	5
2.1.2 You provide a list of compulsory bibliography for your students to read and produce academic essays or papers.	1	2	3	4	5
2.1.3 You assign your students writing topics in pairs or groups under your tutorial or tutorial of other lecturers.	1	2	3	4	5
2.1.4 You meet with your students individually or in groups once a week/month for tutorial (supervision) of essay or paper writing.	1	2	3	4	5
2.1. Involvement in discussion or critical analysis of academic essays or papers					
2.2.1 Your students present academic essays or papers individually for class discussion.	1	2	3	4	5
2.2.2 Your students present academic essays or papers in pairs or groups for class discussion.	1	2	3	4	5
2.2.3 Your students do critical analysis of their partners' academic essays or papers as a tutorial task.	1	2	3	4	5
2.2.4. Your students do literature review and critique.	1	2	3	4	5
2.3 Assessment on research process					
2.3.1 You assess your students on writing of academic essays or papers.	1	2	3	4	5

2.3.2 You assess your students on oral presentation of academic essays or papers.	1	2	3	4	5
2.3.3 You assess your students on tutorial of their felllow students' academic essays or papers.	1	2	3	4	5

3. Knowledge construction in the discipline

3.1 Your students learn to construct knowledge in the discipline through problem based learning					
3.1.1 Your provide scenarios or situations of real life problems in the area of the study for students to discuss and find possible solutions or decisions.	1	2	3	4	5
3.1.2 You formulate questions or hypotheses for students to do research.	1	2	3	4	5
3.2 Assessment on problem solving					
3.2.1 You assess your students on solving problems in the area of the study during or at the end of a semester.	1	2	3	4	5
3.2.1 You frame research questions or hypotheses for your students to do research as an assessment activity.	1	2	3	4	5

4. Research-informed learning

4.1 Learning about others' research					
4.1.1 Your students analyse methodologies or research findings of the studies already conducted in the discipline.	1	2	3	4	5
4.1.2 You use dissertations or theses that have already been produced as models for doing research.	1	2	3	4	5
4.1.3. You present current research in the discipline during lectures.	1	2	3	4	5
4.1.3 Your students do laboratory activities.	1	2	3	4	5
4.1 Assessment on learning about others' research					
4.1.1 You assess your students on written test or examinations during or at the end of a smester or year.	1	2	3	4	5
4.1.2 You assess your students on writing or presenting assignments at the end of a course or module.	1	2	3	4	5

Thank you for your time!

Apendice R: Questionário para docentes sobre a integração do ensinio e a pesquisa no Curso de Educação Ambiental da Faculdade de Educação-UEM

Sou estudante do Curso de Mestrado em Estudos do Ensino Superior e Desenvolvimento da Faculdade de Educação na UEM e estou a desenvolver um projecto de dissertação do tema intitulado "A Integração do Ensino e a Pesquisa nos Currícula do Ensino Superior", o Estudo de Caso da UEM. Este questionário destina-se para docentes do Curso de Licenciatura em Engenharia Civil da Faculdade de Engenharia na UEM. O questionário está dividido em quatro partes e cada parte contém diferentes afirmações sobre a integração do ensino e a pesquisa no ensino superior e têm como objectivo de obter o seu sentimento, percepção e práticas em relação à integração do ensino e a pesquisa ao longo do curso de licenciatura que lecciona. O questionário deve ser respondido num prazo de 10 dias apartir da data da sua entrega. As suas respostas ajudarão-nos analisar a efectividade dos desenhos curriculares, métodos e práticas de ensino que os docentes usam para integrar o ensino e a pesquisa durante o processo de ensino e aprendizagem. Porém, as suas respostas serão mantidas confidenciais e os resultados serão usados para efeitos de pesquisa somente. Por favor leia atentamente o questionário e ponha um círculo na afirmação que melhor expressa o seu sentimento, pensamento ou práticas sobre a integração do ensino e a pesquisa ao longo do curso de licenciatura que lecciona. Use a escala indicada no rectângulo que se segue.

Concordo totalmente	Concordo	Nem concordo Nem discordo	Não concordo	Não concordo totalmente
1	2	3	4	5

1. Os estudantes aprendem como fazer pesquisas e realizam pesquisas

1.1 O uso de actvidades de pesquisa no curso de licenciatura que lecciona encoraja os estudantes a:					
1.1.1 Realizar projectos individuais de pesquisa.	1	2	3	4	5
1.1.2 Realizar projects de pesquisa em grupos.	1	2	3	4	5

1.1.3 Realizar entrevistas como trabalho de campo para projectos de pesquisa.	1	2	3	4	5
1.1.4 Realizar observações como trabalho de campo para projectos de pesquisa.	1	2	3	4	5
1.1.5 Auxiliar as pesquisas dos docentes ao nível do curso, departamento ou faculdade.	1	2	3	4	5
1.1.6 Recolher ou analisar dados para pesquisas dos docentes.	1	2	3	4	5
1.2 Avaliação baseada em pesquisa					
1.2.1 Os seus estudantes são avaliados em realização de projectos de pesquisa durante ou no final do semestre.	1	2	3	4	5
1.2.2 Os seus estudantes são avaliados em realização de entrevistas ou observações de campo durante ou no final do semestre.	1	2	3	4	5

2. Aprendizagem sobre processos de pesquisa

2.1. Leitura e elaboração de trabalhos académicos					
2.1.1 Os seus estudantes fazem leituras e produzem trabalhos académicos através da bibliografia recomendada pelo docente.	1	2	3	4	5
2.1.2 Os seus estudantes fazem leituras e produzem trabalhos académicos através da bibliografia obrigatória fornecida pelo docente.	1	2	3	4	5
2.1.3 Durante o curso, os seus estudantes escrevem trabalhos académicos sob a sua tutoria (supervisão) ou sob a tutoria doutros docentes dentro ou fora do curso que lecciona.	1	2	3	4	5
2.1.4 Durante o curso, os docentes encontram-se com os seus estudantes individualmente ou em grupos uma vez por semana ou mês para serviços de tutoria (supervisão) de trabalhos académicos.	1	2	3	4	5
2.2. Envolvimento dos estudantes na discussão ou análise crítica dos trabalhos académicos					
2.2.1 Os seus estudantes apresentam trabalhos académicos individualmente para a sua discussão na sala de aulas.	1	2	3	4	5
2.2.2 Os seus estudantes apresentam trabalhos académicos em pares ou grupos para a sua discussão na sala de aulas.	1	2	3	4	5
2.2.3 Os seus estudantes fazem tutoria (supervisão) de trabalhos académicos doutros estudantes.	1	2	3	4	5
2.2.4. Os seus estudantes fazem a revisão crítica da literatura.	1	2	3	4	5
2.3 Avaliação em processos de pesquisa					
2.3.1 Os seu estudantes são avaliados sobre trabalhos académicos.	1	2	3	4	5

2.3.2 Os seus estudantes são avaliados pela apresentação oral dos seus trabalhos académicos.	1	2	3	4	5
2.3.3 Os seus estudantes são avaliados pela tutoria (supervisão) de trabalhos académicos doutros estudantes.	1	2	3	4	5

3. Construção de conhecimento na disciplina

3.1 Aprendizagem baseada em problematização de assuntos para a construção de conhecimento no contexto da disciplina					
3.1.1 Os seus estudantes realizam discussões sobre problemas da vida real da disciplina afim de achar possíveis soluções.	1	2	3	4	5
3.1.2 Os estudantes realizam pesquisas através das perguntas ou hipóteses formuladas pelo docente durante o curso.	1	2	3	4	5
3.2 Avaliação em resolução de problemas					
3.2.1 Os seus estudantes são avaliados em discussão ou resolução de problemas no contexto da disciplina durane ou no final do semestre.	1	2	3	4	5
3.2.2 Os seus estudantes são dados perguntas ou hipóteses para realizarem pesquisa como forma de avaliação durante or no final do semestre.	1	2	3	4	5

4. Aprendizagem sobre pesquisa direcionada

4.1 Aprendizagem baseada em trabalhos de pesquisa já feitos por outros					
4.1.1 Os seus estudantes analisam metodologias ou conclusões de pesquisas já feitas ao nível da disciplina.	1	2	3	4	5
4.1.2 Os docentes devem usar dissertações ou teses já produzidas por outros como modelo para os seus estudantes realizarem pesquisa.	1	2	3	4	5
4.1.3. O docente deve apresentar estudos sobre pesquisas recentes ao nível da disciplina que lecciona.	1	2	3	4	5
4.1.4 Os seus estudantes realizam actividades de laboratório.	1	2	3	4	5
4.2 Avaliação sobre aprendizagem baseada em pesquisa ja feitas					
4.2.1 Os seus estudantes fazem testes ou exames escritos durante ou no final do semestre.	1	2	3	4	5
4.2.2 Os seus estudantes escrevem ou apresentam trabalhos académicos como forma de avaliação durante ou no final do semestre.	1	2	3	4	5

Muito obrigado pela sua colaboração!

Appendix S: Questionnaire for lecturers about research and teaching linkages in the CELC of the Faculty of Engineering-UEM

I am a master student from Higher Education Studies and Development Course in the Faculty of Education at UEM and I am working on my dissertation project. The topic of the dissertation project is entitled 'Research-teaching nexus in Mozambican Higher Education Curricula', the case study of UEM. I have designed this questionnaire for the lecturers in the Civil Engineering Licenciatura Course of the Faculty of Engineering at UEM. The questionnaire is divided into four parts and each part has different statements related to the integration of research and teaching in higher education. The aim of this questionnaire is to obtain your feelings, perceptions, beliefs and teaching practices in attempt to bring teaching and research together in the course that you lecture. This questionnaire should be completed within 10 days from now (the date of submission). Your answers will help us to analyse the effectiveness of curriculum designs and teaching practices used by the lecturers to link teaching and research in higher education. The responses will be kept strictly confidential and the results will be used for research purpose only. Please read carefully the questionnaire and circle each statement which best expresses how you feel or think about the integration of research and teaching throughout the licenciatura course that you lecture. Use the rating scale from the box below.

Strongly agree	Agree	Neither agree Nor disagree	Disagree	Strongly disagree
1	2	3	4	5

1. Students learn how to do research and they are researchers

1.1 The use of research activities in the undergraduate licenciatura course you lecture foster students to:					
1.1.1 Conduct individual research projects.	1	2	3	4	5
1.1.2 Conduct group research projects.	1	2	3	4	5
1.1.3 Conduct interview in the field for research projects.	1	2	3	4	5

1.1.3 Conduct interview in the field for research projects.	1	2	3	4	5
1.1.4 Conduct observation in the field for research projects.	1	2	3	4	5
1.1.5 Assist the lecturers' research in the course level, department/faculty level.	1	2	3	4	5
1.1.6 Colect/analyse data for lecturers' research.	1	2	3	4	5
1.2 Assessment on knowledge construction					
1.2.1 You assess your students on research projects during or at the end of a semester.	1	2	3	4	5
1.2.2 You assess your students on fieldwork research during or at the end of a semester.	1	2	3	4	5

2. Students learn research process

2.1. Reading and writing of academic essays or papers					
2.1.1 You recommend bibliography for your students to read and produce academic essays or papers.	1	2	3	4	5
2.1.2 You provide a list of compulsory bibliography for your students to read and produce academic essays or papers.	1	2	3	4	5
2.1.3 You assign your students writing topics in pairs or groups under your tutorial or tutorial of other lecturers.	1	2	3	4	5
2.1.4 You meet with your students individually or in groups once a week/month for tutorial (supervision) of essay or paper writing.	1	2	3	4	5
2.1. Involvement in discussion or critical analysis of academic essays or papers					
2.2.1 Your students present academic essays or papers individually for class discussion.	1	2	3	4	5
2.2.2 Your students present academic essays or papers in pairs or groups for class discussion.	1	2	3	4	5
2.2.3 Your students do critical analysis of their partners' academic essays or papers as a tutorial task.	1	2	3	4	5
2.2.4. Your students do literature review and critique.	1	2	3	4	5
2.3 Assessment on research process					
2.3.1 You assess your students on writing of academic essays or papers.	1	2	3	4	5

2.3.2 You assess your students on oral presentation of academic essays or papers.	1	2	3	4	5
2.3.3 You assess your students on tutorial of their felllow students' academic essays or papers.	1	2	3	4	5

3. Knowledge construction in the discipline

3.1 Your students learn to construct knowledge in the discipline through problem based learning					
3.1.1 Your provide scenarios or situations of real life problems in the area of the study for students to discuss and find possible solutions or decisions.	1	2	3	4	5
3.1.2 You formulate questions or hypotheses for students to do research.	1	2	3	4	5
3.2 Assessment on problem solving					
3.2.1 You assess your students on solving problems in the area of the study during or at the end of a semester.	1	2	3	4	5
3.2.1 You frame research questions or hypotheses for your students to do research as an assessment activity.	1	2	3	4	5

4. Research-informed learning

4.1 Learning about others' research					
4.1.1 Your students analyse methodologies or research findings of the studies already conducted in the discipline.	1	2	3	4	5
4.1.2 You use dissertations or theses that have already been produced as models for doing research.	1	2	3	4	5
4.1.3. You present current research in the discipline during lectures.	1	2	3	4	5
4.1.3 Your students do laboratory activities.	1	2	3	4	5
4.1 Assessment on learning about others' research					
4.1.1 You assess your students on written test or examinations during or at the end of a smester or year.	1	2	3	4	5
4.1.2 You assess your students on writing or presenting assignments at the end of a course or module.	1	2	3	4	5

Thank you for your time!

Apendice T: Questionário para docentes sobre a integração do ensino e a pesquisa no Curso de Engenharia Civil da Faculdade de Engenharia-UEM

Sou estudante do Curso de Mestrado em Estudos do Ensino Superior e Desenvolvimento da Faculdade de Educação na UEM e estou a desenvolver um projecto de dissertação do tema intitulado "A Integração do Ensino e a Pesquisa nos Currícula do Ensino Superior", o Estudo de Caso da UEM. Este questionário destina-se para docentes do Curso de Licenciatura em Engenharia Civil da Faculdade de Engenharia na UEM. O questionário está dividido em quatro partes e cada parte contém diferentes itens sobre a integração do ensino e a pesquisa no ensino superior e têm como objectivo de obter o seu sentimento, percepção e práticas em relação à integração do ensino e a pesquisa ao longo do curso de licenciatura que lecciona. O questionário deve ser respondido num prazo de 10 dias apartir da data da sua entrega. As suas respostas ajudarão-nos analisar a efectividade dos desenhos curriculares, métodos e práticas de ensino que os docentes usam para integrar o ensino e a pesquisa durante o processo de ensino e aprendizagem. Porém, as suas respostas serão mantidas confidenciais e os resultados serão usados para efeitos de pesquisa somente. Por favor leia atentamente o questionário e ponha um círculo na afirmação que melhor expressa o seu sentimento, pensamento ou práticas sobre a integração do ensino e a pesquisa ao longo do curso que lecciona. Use a escala indicada no rectângulo que se segue.

Concordo totalmente	Concordo	Nem concordo Nem discordo	Não concordo	Não concordo totalmente
1	2	3	4	5

1. Os estudantes aprendem como fazer pesquisas e realizam pesquisas

1.1 O uso de actvidades de pesquisa no curso de licenciatura que lecciona encoraja os estudantes a:					
1.1.1 Realizar projectos individuais de pesquisa.	1	2	3	4	5
1.1.2 Realizar projects de pesquisa em grupos.	1	2	3	4	5
1.1.3 Realizar entrevistas como trabalho de campo para projectos de pesquisa.	1	2	3	4	5

1.1.4 Realizar observações como trabalho de campo para projectos de pesquisa.	1	2	3	4	5
1.1.5 Auxiliar as pesquisas dos docentes ao nível do curso, departamento ou faculdade.	1	2	3	4	5
1.1.6 Recolher ou analisar dados para pesquisas dos docentes.	1	2	3	4	5
1.2 Avaliação baseada em pesquisa					
1.2.1 Os seus estudantes são avaliados em realização de projectos de pesquisa durante ou no final do semestre.	1	2	3	4	5
1.2.2 Os seus estudantes são avaliados em realização de entrevistas ou observações de campo durante ou no final do semestre.	1	2	3	4	5

2. Aprendizagem sobre processos de pesquisa

2.1. Leitura e elaboração de trabalhos académicos					
2.1.1 Os seus estudantes fazem leituras e produzem trabalhos académicos através da bibliografia recomendada pelo docente.	1	2	3	4	5
2.1.2 Os seus estudantes fazem leituras e produzem trabalhos académicos através da bibliografia obrigatória fornecida pelo docente.	1	2	3	4	5
2.1.3 Durante o curso, os seus estudantes escrevem trabalhos académicos sob a sua tutoria (supervisão) ou sob a tutoria doutros docentes dentro ou fora do curso que lecciona.	1	2	3	4	5
2.1.4 Durante o curso, os docentes encontram-se com os seus estudantes individualmente ou em grupos uma vez por semana ou mês para serviços de tutoria (supervisão) de trabalhos académicos.	1	2	3	4	5
2.2. Envolvimento dos estudantes na discussão ou análise crítica dos trabalhos académicos					
2.2.1 Os seus estudantes apresentam trabalhos académicos individualmente para a sua discussão na sala de aulas.	1	2	3	4	5
2.2.2 Os seus estudantes apresentam trabalhos académicos em pares ou grupos para a sua discussão na sala de aulas.	1	2	3	4	5
2.2.3 Os seus estudantes fazem tutoria (supervisão) de trabalhos académicos doutros estudantes.	1	2	3	4	5
2.2.4. Os seus estudantes fazem a revisão crítica da literatura.	1	2	3	4	5
2.3 Avaliação em processos de pesquisa					
2.3.1 Os seu estudantes são avaliados sobre trabalhos académicos.	1	2	3	4	5

2.3.2 Os seus estudantes são avaliados pela apresentação oral dos seus trabalhos académicos.	1	2	3	4	5
2.3.3 Os seus estudantes são avaliados pela tutoria (supervisão) de trabalhos académicos doutros estudantes.	1	2	3	4	5

3. Construção de conhecimento na disciplina

3.1 Aprendizagem baseada em problematização de assuntos para a construção de conhecimento no contexto da disciplina					
3.1.1 Os seus estudantes realizam discussões sobre problemas da vida real da disciplina afim de achar possíveis soluções.	1	2	3	4	5
3.1.2 Os estudantes realizam pesquisas através das perguntas ou hipóteses formuladas pelo docente durante o curso.	1	2	3	4	5
3.2 Avaliação em resolução de problemas					
3.2.1 Os seus estudantes são avaliados em discussão ou resolução de problemas no contexto da disciplina durane ou no final do semestre.	1	2	3	4	5
3.2.2 Os seus estudantes são dados perguntas ou hipóteses para realizarem pesquisa como forma de avaliação durante or no final do semestre.	1	2	3	4	5

4. Aprendizagem sobre pesquisa direcionada

4.1 Aprendizagem baseada em trabalhos de pesquisa já feitos por outros					
4.1.1 Os seus estudantes analisam metodologias ou conclusões de pesquisas já feitas ao nível da disciplina.	1	2	3	4	5
4.1.2 Os docentes devem usar dissertações ou teses já produzidas por outros como modelo para os seus estudantes realizarem pesquisa.	1	2	3	4	5
4.1.3. O docente deve apresentar estudos sobre pesquisas recentes ao nível da disciplina que lecciona.	1	2	3	4	5
4.1.4 Os seus estudantes realizam actividades de laboratório.	1	2	3	4	5
4.2 Avaliação sobre aprendizagem baseada em pesquisa ja feitas					
4.2.1 Os seus estudantes fazem testes ou exames escritos durante ou no final do semestre.	1	2	3	4	5
4.2.2 Os seus estudantes escrevem ou apresentam trabalhos académicos como forma de avaliação durante ou no final do semestre.	1	2	3	4	5

Muito obrigado pela sua colaboração!