Threshold concepts and the development of initial teacher identity in English language teacher education in Oman: an investigation of students' perceptions

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Statement of Copyright

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Dedication

I dedicate the achievement of obtaining a doctorate degree to the soul of my father, my dear mother and my lovely family.

Abstract

According to Meyer and Land (2003), threshold concepts are the most important concepts in disciplines at higher education. Understanding a threshold concept helps students to go through an epistemological and ontological shift in their ways of thinking and practice (Meyer & Land, 2003; Davies, 2006). Threshold concepts have been characterised as transformative, irreversible, integrative, troublesome, bounded, reconstitutive, and discursive. To date, little research has been conducted to identify threshold concepts in teacher education, especially in English teacher education programmes in a non-English speaking country like Oman.

This thesis has identified the knowledge student teachers in Oman experience as threshold concepts and the way in which they interact with and understand such concepts. It has also investigated how those threshold concepts support the development of an initial teacher identity. This was done by implementing a mixed methods design, using a questionnaire and semi-structured interview. A compare and contrast analysis was used for analysing the quantitative data obtained from a total of 212 Y1 and Y4 student teachers at two Omani colleges, whereas the qualitative data were generated from 20 semi-structured interviews which were analysed thematically.

Critical thinking, teaching methods, classroom management and assessment were identified as threshold concepts in teacher education, though some researchers may question the inclusion of classroom management as a threshold concept as it is a practice not a concept. The inclusion of classroom management demonstrates that identifying threshold concepts in teacher education is a complex process since skills-based thresholds and classroom practices cannot be easily separated.

Finally, the analysis showed that Y1 student teachers tended to experience language-related concepts as threshold concepts, whereas Y4 student teachers focused on pedagogy-oriented concepts. The findings will help educators, instructors and course designers improve the curricula of teacher education at those Omani colleges as well as other institutions and benefit the development of students' initial teacher identity.

Table of Contents

List of Tables

List of Figures

Abbreviations

OAAA	Oman Academic Accreditation Authority
ASU	A pseudonym for an Omani college
CRU	A pseudonym for an Omani college
Y1	First Year of Study at Tertiary Level
Y4	Fourth Year of Study at Tertiary Level
ELT	English Language Teaching

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 Introduction

Higher education in many countries is experiencing major changes through educational reforms which cannot be isolated from the political and economic changes that have been taking place around the world with the rise of neoliberalism. Universities are being driven to market-oriented education where higher education is becoming economy-driven rather than education-targeted and students are being considered as consumers of services rather than receivers of knowledge. With such a view of higher education, students' experiences, needs, expectations and satisfaction during their studies are becoming an indicator of quality assurance and contributing to the governance of the educational system (Biesta, 2005). Oman is not isolated from the influence of political and economic changes. Therefore, the Oman Academic Accreditation Authority (OAAA), which was established in 2010, has implemented a comprehensive scheme for evaluating and developing the quality of higher education in institutions according to international standards, one of which is the quality of teaching and learning as perceived by students. This is a major strategic goal that should be addressed in the programmes of higher education institutions in Oman.

Due to the fact that political and economic changes are turning students into consumers and stakeholders in the institutions of higher education where their voices should be heard, getting students to really experience transformative learning has become a necessity in the curricula of higher education. A learning environment that facilitates students' interaction with and acquisition of knowledge and enriches their learning experiences, while undergoing an epistemological and ontological shift towards forming professional identities has

become the main concern of higher education. Addressing the need for enhancing transformational learning in higher education (Cove, McAdam, & McGonigal, 2008), Meyer and Land (2003) propose the notion of threshold concepts in order to provide students with transformative knowledge and ways of thinking and practising within their disciplines.

The notion of threshold concepts is proposed by Meyer and Land (2003) in order to investigate and identify the most powerful concepts in a discipline in higher education, where students undergo an epistemological and ontological shift in their ways of thinking and practising (Davies, 2006; Meyer & Land, 2003). Those threshold concepts, once understood, enable students to become more aware of their learning experiences in order to make more sense of the knowledge that constitutes a discipline (Davies, 2006); thus, students become able to think, talk and act like professionals once they grasp a full understanding of threshold concepts. As they are considered powerful knowledge, threshold concepts are different from other concepts, and are characterised as transformative, irreversible, integrative, troublesome, bounded, reconstitutive, and discursive (Chen & Rattray, 2017; Davies, 2006; Meyer & Land, 2006).

Since it was introduced in 2003, the notion of threshold concepts has attracted many researchers from different fields, who have been investigating and identifying those concepts in order to improve the quality of teaching and learning in higher education by selecting, organising and presenting the knowledge necessary for ontological and epistemological change in students' identities.

Teacher education prepares students to become teachers who provide knowledge to and facilitate learning experiences. While some research has been conducted on threshold concepts in English Language Teaching (ELT),

this important discipline deserves more attention, especially in a non-English speaking country like Oman.

1.2 Research Rationale

Teacher education programmes in English language teaching (ELT) are present as a discipline at some universities and colleges in Oman, which have the authority to award BA degrees in English language teaching (ELT) at high schools or even the foundation programmes at universities. Like other programmes, teacher education is going through the process of programme accreditation. Therefore, any recommendations based on research findings to improve the curriculum, quality of teaching and learning and/or students' experiences will be much appreciated by the stakeholders, one of which is the students themselves.

Students who join ELT teacher education programmes are mainly Omani whose mother tongue is Arabic. Therefore, their learning experiences to become teachers of English in an Arabic-speaking country need to be addressed and investigated. It will be interesting to identify any threshold concepts that help them experience an epistemological and ontological shift in their identities.

1.3 Importance of the Study

Higher education in Oman has recently been undergoing educational reform, which systematically and periodically evaluates the performance of higher education institutions in Oman. This process is supervised by the Omani Academic Accreditation Authority (OAAA), which was established in 2010. The main goal of this reform as stated by the OAAA is, "to provide efficient, effective and internationally recognized services for accreditation in order to promote

quality in higher education in Oman and meet the needs of the public and other stakeholders" (OAAA, 2019). As a result, all universities and colleges in Oman are subject to a 5-year OAAA evaluation to attain institutional and programme accreditation in order to be recognised as accredited institutions of higher education. A major area of the evaluation is academic programmes and students' experiences through providing evidence of the quality of teaching and learning. Failing to meet the OAAA standards, institutions are placed one-year probation before a decision is made to close the academic programme, if they do not show any improvement. Teacher education programmes are also subject to the OAAA programme accreditation; therefore, addressing student teachers' experiences of learning is one of the indicators that contribute to the improvement of the quality of teaching and learning in Omani colleges.

As no research has been carried out to identify threshold concepts in the teacher education programmes of English language teaching (ELT) in Oman, it would be worthwhile to investigate any potential threshold concepts through investigating the learning experiences of Omani ELT student teachers. Investigating students' transformative learning and liminal space through their actual experiences could lead to results and suggestions to improve the quality of teaching and learning in the ELT teacher education programmes in Oman, especially as English language is not a native language of those student teachers. For all the previous reasons, it is important to conduct research on identifying potential threshold concepts in two ELT teacher education programmes in Oman.

1.4 Gap in Research of Threshold Concepts in English Language Teacher Education

The literature on threshold concepts shows that little research has been conducted on English Language Teaching (ELT) teacher education. The ELT discipline has not received enough attention from the researchers of threshold concepts due to the fact that the notion of threshold concepts is more appealing to natural sciences such as physics and maths rather than social sciences such as education. However, with the increasing acknowledgement of the importance of developing teacher identity in teacher education programmes (Beauchamp & Thomas, 2009; Flores & Day, 2006; Malderez, Hobson, Tracey, & Kerr, 2007; Sachs, 2005), more research should be carried out to address threshold concepts in teacher education, which will help develop an initial teacher identity in student teachers. The research findings, interpretations and implications are expected to contribute to the literature on threshold concepts, and could potentially have significant impact on the development of English language teacher education programmes in Oman and probably other Arabic-speaking countries with similar social, economic and political context. In addition, we need more research on ELT threshold concepts in order to contribute to the conceptual framework of organising and presenting knowledge in the curricula of ELT teacher education programmes, which will help improve students' ways of thinking and practising in a more meaningful way (Meyer & Land, 2003; Meyer & Land, 2005; Meyer & Land, 2006).

1.4.1 Personal Motivation

Apart from wanting to improve the experiences of Omani student teachers in their journey to becoming teachers of English and contributing to the literature of

threshold concepts, there is also a personal reason which has encouraged me to carry out research into threshold concepts in teacher education. In my MA research (Alyafaee, 2004, unpublished) on a group of in-service Omani ELT teachers and their level of involvement in designing their in-service educational and training (INSET) workshops, one of the findings showed that those teachers lacked confidence in participating in the design of their in-service workshops, and they clearly acknowledged the importance of knowledge providers such as English language supervisors and educationists. Since then, I have become interested to explore the reasons why those experienced teachers lacked confidence and still believed in knowledge providers addressing their needs and guiding them to improve their teaching performance and shape their teacher identity.

Another personal motivation which also encouraged me to conduct research on threshold concepts in teacher education was my job as a supervisor of English, which involved evaluating teachers' performances in classrooms. In post-discussion lessons, many teachers (especially the new ones) expressed their doubt and uncertainty about delivering good lessons based on the newly implemented teaching approaches such as task-based and learner-centred.

When I attended one of the seminars conducted by Professor Ray Land at Durham University in 2012, it became clear that the conceptual framework of threshold concepts with the notions of epistemological and ontological shift, ways of thinking and practising and liminal space could have provided me with answers. Reflecting on those teachers' concerns opened my eyes to some areas I was not aware of at that time: troublesome knowledge, liminal space, transformational shift, and other key features of threshold concepts. Those teachers were struggling with troublesome knowledge and liminal space. I,

unaware of the concept of threshold concepts back then, could not figure out how to support them in a more effective way. I believe having the knowledge of threshold concepts at that time could have helped me address those teachers' concerns in a more meaningful way. Thus, I have found the notion of threshold concepts interesting as it could improve the curricula in ELT teacher education as well as help teacher students develop initial teacher identity.

1.5 Context of the Study

This research study was carried out in Oman which is an Arab-speaking country in the south of the Arabian Peninsula in Southwest Asia. Though the only official language is Arabic, English is widely used in business and academic institutions. It is one of the main subjects in the educational system at school, and students start learning it from Grade 1 up to Grade 12. At most higher education institutions, students cannot proceed to study the first year of their discipline at college unless they either provide an IELTS 5-overall grade or complete a three-semester foundation programme where they study English along with Math and IT. Though English has a very important status in Oman and many jobs require a high proficiency of English, it still cannot be given the status of second language as the Omani constitution does not acknowledge it as an official language and Omani families do not use it in their everyday life. Therefore, if students do not live in big cities where the majority of speakers of English work and could be communicated with, they will not get the opportunity to practise the language outside classrooms.

With the aim of investigating threshold concepts as experienced by Omani ELT student teachers, the research was conducted in two co-educational Omani colleges, ASU and CRU (pseudonyms). Both colleges are located in the north of

Oman, approximately 1000km away from the residence of the researcher who lives in the southern part of Oman. The reason for selecting these two colleges was that they are considered among the best institutions providing ELT teacher education programmes in Oman and authorized to award BA degrees for the teaching of English at schools as well as in the foundation programmes at colleges. Therefore, they attract the majority of Omani students who want to become English teachers. Both colleges implement high admissions standards and the competitive score of the admissions entry is more than 90%. This means only students with A-grades (equal to 90%+ marks) are admitted to pursue their teaching career. The IELTS or any equivalent international certificate is not a requirement at both institutions. However, students are required to take a placement test, through which they could either directly join the first year of their ELT programme or study compulsory English courses in the foundation year. Once they join the first year of their ELT programme, the duration of their ELT programme is four years with eight semesters. At both institutions, almost all the subjects in Year 1 are not related to ELT teacher education. As for teaching practice, students at ASU have the practicum session in Year 4, semester 8, whereas students at CRU have four practicum sessions starting from Year 3, semester 5. Both groups go to schools to teach school students under the supervision of their instructors. See Appendix A for more details on how the subjects are distributed in the study plan at ASU and CRU.

The participants in this research study at both ASU and CRU colleges were male and female Omani students who were all studying English Language Teaching (ELT) as their major in their teacher education programmes in order to graduate with BA degrees and be qualified to teach English at Omani schools. Their mother tongue was Arabic, while English could not be considered their

second language as it was not spoken in their homes by their parents. The age of participants ranged from 18 to 20 for Year 1 (Y1) students and from 22 to 24 for Year 4 (Y4) students. Many participants were not local to their colleges, but came from different regions all over Oman. Most of the female participants stayed in on-campus college-catered accommodations, whereas the male participants lived in off-campus self-rented flats. Both genders were studying in co-educational colleges.

1.6 Theoretical and Analytical Framework of the Study

This research study is based on the theoretical framework of threshold concepts proposed by Meyer and Land (2003). According to them, threshold concepts are the most important concepts in a discipline which result in transformational learning students can experience in their study. As they are different from basic and core concepts, threshold concepts have a set of characteristics which are transformative, troublesome, integrative, irreversible, bounded, reconstitutive and discursive (see chapter 2 for more details).

Theoretically informed by the characteristics of threshold concepts, an analytical framework based on a mixed methods approach was implemented to identify any potential threshold concepts in English teacher education as experienced by Omani student teachers whose English is neither their mother tongue nor their second language. Participants' responses to both questionnaires and interviews were investigated and analysed according to the characteristics of threshold concepts with more focus on troublesome and transformative aspects. It is important to note that incorporating a quantitative data collection tool like a questionnaire to identify threshold concepts is quite unusual in the literature on identifying threshold concepts. The common practice

is the use of interviews or other qualitative data collection instruments as they provide in-depth, detailed data on participants' experiences, attitudes and beliefs. Yet, the implementation of a questionnaire in this research study was expected to provide additional, useful data that could help find answers to the research questions.

1.7 Research Questions

The purpose of this research was to identify any potential threshold concepts in ELT teacher education in Oman. Therefore, the main research question was as follows:

Do Fourth Year Omani students of English Language Teacher Education encounter any threshold concepts that impact on the development of their initial teacher identity?

In order to reach an answer to the research question, it would be important to find answers to the following sub questions:

1. What concepts are difficult and cause troublesome knowledge?

2. Why do those concepts cause troublesome knowledge?

3. What strategies do students use to overcome difficulty and understand those concepts?

4. What concepts make students experience transformational learning?

5. If there is a threshold concept, does it help develop student teachers' initial teacher identity?

1.8 Organisation of the Study

This research study is divided into six chapters.

Chapter 1 gives a brief overview of the context in which this study is situated and describes the theoretical and analytical framework of this research study.

In chapter 2, a critically detailed discussion is presented on the nature of threshold concepts in terms of its characteristics. It focusses more on the troublesome knowledge of a threshold concept as it plays a vital part when students go through the liminal space and on the transformative feature as a concept cannot be considered a threshold concept if it does not have any epistemological and ontological shift. As threshold concepts cannot be isolated from other educational theories and terms, the chapter also discusses some other related concepts such as knowledge construction, community of practice, teacher education, teacher identity and curriculum.

Chapter 3 gives details on the methodology and design of the study. It also discusses the reasons why the data collection tools of a questionnaire and interview were selected and how they were implemented. In addition, the reasons why the pilot study was not effective are presented and a discussion of ethical issues is included. Finally, it also provides a rationale for methodological decisions taken as well as a discussion of challenges encountered and the ways in which these were addressed.

Chapter 4 presents the findings of the quantitative and qualitative data obtained from the two colleges. It shows how the data obtained from the four groups of participants' questionnaires were compared and contrasted in order to establish a list of potential threshold concepts in teacher education. It also shows how those potential threshold concepts are addressed in participants'

accounts in the interview sessions in terms of the troublesome knowledge and transformative characteristics.

In chapter 5, a discussion on the findings is presented. It attempts to re-examine the notion of threshold concepts, troublesome knowledge and liminal space by making sense of the data analysed. In addition, it addresses any relationship between the identified threshold concepts and the development of initial teacher identity.

Chapter 6 provides answers to the research questions of the study and presents some key findings and implications which were obtained from the research study. Some suggestions are offered as contributions to the knowledge on threshold concepts, curricula and teacher identity. In addition, some implications for practice and future research on identifying threshold concepts are presented and some limitations to the study are highlighted. Finally, the chapter concludes by reflecting on the whole experience of conducting this research study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Meyer and Land (2003) propose threshold concepts as a conceptual framework for identifying the most important concepts within disciplines of higher education. They claim that discipline-related threshold concepts, once understood, help students experience different ways of thinking and practising that enable them to interact and understand knowledge more effectively and see themselves and the world in a different way epistemologically as well as ontologically. This chapter begins with the notion of threshold concepts and how it has developed throughout the years. It also discusses how threshold concepts transform students' learning and critically presents some arguments against threshold concepts in terms of definition, characteristics and research methodology used to identify those concepts. In order to contextualise the nature of threshold concepts within the domain of epistemological and ontological shift, the chapter sheds light on some other concepts and theories which could directly and indirectly influence students' understanding of threshold concepts such as the concept of knowledge, learners' orientations to learning, critical reflection and community of practice. It is followed by an exploration of the fundamentals of teacher education and how threshold concepts could contribute to the development of initial teacher identity. In addition, it presents some research on threshold concepts conducted in teacher education. The chapter ends with a discussion of the possibility of using threshold concepts to design the curricula of disciplines in order to improve higher education.

2.2 The Notion of Threshold Concepts

In their attempt to organise and present tertiary discipline-oriented knowledge in a more coherent, meaningful way, Meyer and Land first introduced their notion of threshold concepts at a conference in the UK in 2003. They concluded from their interviews and observations in a UK national research project on effective teaching and learning in higher education that certain concepts in the discipline of economics are essential as they work as conceptual gateways to help students master their subject knowledge in order to become economists. They expanded their research to other disciplines and came to the same conclusion that there are some essential concepts within a discipline which are distinct from what are typically described as ‘core concepts’. Therefore, Meyer and Land defined threshold concepts as:

> akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress.
>
> (Meyer & Land, 2003, p. 1)

In order to differentiate threshold concepts from core concepts, Meyer and Land (2003, pp. 4-5) pointed out that a core concept works as “a conceptual building block” that enhances students’ understanding, but learners do not necessarily experience a “qualitatively different view of subject matter” from it as a threshold concept does. They provided the concepts of gravity and centre of gravity as an example from the discipline of physics for what can be seen as a threshold concept ‘gravity’ and what is considered a core concept ‘centre of gravity’. They argued that the concept of ‘gravity’ represents a threshold concept as it shifts learners’ understanding to a different view of physics as well as the world. On the other hand, they described the concept of ‘centre of gravity’ as a core

concept because it helps students make progress in their understanding of physics, but does not lead to a transformative change in learners' views of subject matter. With a similar argument for essential concepts that could be described as threshold concepts, they stated that 'complex number' and 'limit' are threshold concepts in Mathematics and 'opportunity cost' is a threshold concept in economics (Meyer & Land, 2006).

The notion of threshold concepts has been developed with more emphasis on the transformational shift on ways of thinking and practising. Threshold concepts have become "concepts that bind a subject together, being fundamental to ways of thinking and practising in that subject" (Land, Cousin, Meyer, & Davies, 2005, p. 54). As the aspect of transformational learning is an integral part in threshold concepts, Meyer and Land (2006) point out that understanding a threshold concept leads to "a transformed internal view of subject matter, subject landscape, or even world view" (p. 3). This kind of transformed view, according to them, helps learners become aware of how they "perceive, apprehend, or experience particular phenomena within that discipline" (p. 3). In other words, learners who experience transformational understanding and learning will go through epistemological and ontological change. Epistemologically, they will see knowledge as a connected, meaningful network of ideas and concepts that constitute their subject matter. Ontologically, they will experience a different view of who they are and see themselves as teachers not only learners. With epistemological and ontological change, learners will not feel isolated from the community of a particular discipline as they share with them the same ways of thinking and practising (Davies, 2006).

Nevertheless, the nature of threshold concepts seems to be vague and not easy to identify, especially when we attempt to distinguish a threshold concept

from a core concept. The example of gravity and centre of gravity is not enough to guide instructors and/or curriculum designers to be able to differentiate between the two types of concepts. This raises a very important question that should be addressed here: *how can we identify threshold concepts within a discipline?* In order to provide an answer to the question, Meyer and Land (2003) propose a conceptual framework of characteristics through which we could identify threshold concepts within a discipline. The following section discusses the characteristics of threshold concepts.

2.2.1 Characteristics of Threshold Concepts

Threshold concepts possess a certain set of characteristics that make them unique, powerful and, therefore, different from subject-related concepts such as basic concepts or core concepts (Meyer & Land, 2003; Meyer & Land, 2005). In order to classify threshold concepts distinctively from other concepts, Meyer and Land suggest a conceptual framework through which a threshold concept in a discipline could be identified.

According to Meyer and Land, a threshold concept is transformative. In other words, when students get fully grasp or understand a threshold concept, they should experience “a significant shift in the perception of a subject”, “a transformation of personal identity” and “a shift in values, feeling or attitude” (2006, p. 7). This kind of transformational effect experienced by learners is so powerful that it changes one’s epistemological and ontological beliefs: a new view into knowledge and into self being. Therefore, threshold concepts help learners to experience transformational learning, while core concepts, though important, fail to do so.

A second characteristic is that a threshold concept is probably irreversible (Meyer & Land, 2006). Once a threshold concept is understood, it is highly "unlikely to be forgotten, or will be unlearned only by considerable effort" (p. 7). As a threshold concept depends on understanding that involves interacting deeply with knowledge, such acquisition of knowledge is firmly fixed in learners' cognitive capacity, and hence it becomes almost unforgettable.

The third feature is that threshold concepts are integrative. The integrative aspect of a threshold concept, as Meyer and Land explain, reveals how a threshold concept gives meaning and connection to other previously hidden, interrelated concepts. Some concepts might seem unrelated to and disconnected from other concepts when first encountered by students. The non-relatedness of those concepts turns out to be not the case as a threshold concept, once understood, connects and gives coherence to the relationship of other concepts.

As for the fourth characteristic, a threshold concept is possibly often bounded. In other words, "any conceptual space will have terminal frontiers, bordering with thresholds into new conceptual areas" (Meyer & Land, 2006, p. 8).

Finally, a threshold concept can also (though not necessarily) be potentially troublesome (Meyer & Land, 2006). When encountering a threshold concept, students are highly likely to find it difficult and challenging because the knowledge it represents can be ritual, inert, conceptually difficult, alien, or tacit (Perkins, 2006). This troublesome knowledge creates liminal space where students either get stuck temporarily or permanently. More discussion on troublesome knowledge and liminal space is presented in section 2.2.1.1.

These characteristics of threshold concepts discussed above are summarised as follows:

1. Transformative
2. Probably irreversible
3. Integrative
4. Possibly often (though not necessarily always) bounded
5. Potentially (though not necessarily) troublesome

(Meyer & Land, 2006)

Though they are not considered characteristics of threshold concepts, Meyer and Land (2005) address the importance of discursive and reconstitutive features which accompany the process of crossing threshold concepts. They point out that crossing a threshold concept is facilitated by discipline-oriented discourse as ‘new thinking is brought into being, expressed, reflected upon and communicated’ and results in “a shift in the learner’s subjectivity, a repositioning of the self” (p. 374). Repositioning of the self comes along when students test and negotiate their prior conceptual understanding with the new one as “mastery of a threshold concept often involves messy journeys back, forth and across conceptual terrain” (Cousin, 2006, p. 5). Due to the fact that a threshold concept is linked to the aspect of being discursive and reconstitutive, some researchers add them as characteristics of threshold concepts (Chen & Rattray, 2017; Flanagan, 2016). Hence, the characteristics of threshold concepts might be seen as follows:

1. Transformative
2. Probably irreversible
3. Integrative
4. Possibly often (though not necessarily always) bounded
5. Potentially (though not necessarily) troublesome
6. Discursive
7. Reconstitutive

From the seven characteristics, it can be argued that threshold concepts are indeed different from basic or core concepts, as they go beyond the level of merely cognitive understanding to the level of epistemological understanding of knowledge and ontological change which both result in new ways of thinking and understanding (Davies, 2006). As the literature of threshold concepts has further developed, Land, Meyer, and Flanagan (2016) stress that the characteristic of a threshold concept being transformative is "the superordinate and non-negotiable" (p. xiii). In other words, the experience of seeing the world and oneself in a different way after understanding a threshold concept is what ultimately matters. Such transformational learning that students experience in their study is what makes a threshold concept unique and different from other basic or core concepts. Students can understand basic concepts as separate pieces of knowledge, but they might not have a full understanding of a threshold concept if they do not experience transformational change (Quinnell & Thompson, 2010). Alongside transformative, troublesome knowledge is also "a defining feature of threshold concepts" (Felten, 2016, p. 4). It can be concluded that the two features of transformative and troublesome are the most important characteristics of a threshold concept: being transformative is the essential one, without which a concept cannot be identified as a threshold concept.

However, the notion of threshold concepts has received some critique in regard to their nature and characteristics (O'Donnell, 2009, 2010; Rowbottom, 2007). According to Rowbottom (2007), one of the main concerns stems from the nature of the characteristics of threshold concepts because "providing an account only in terms of accidental properties, even likely ones, is not sufficient" (p. 263). His argument refers to the use of words such as *likely, possibly, probably and potentially* when characterising a threshold concept in order to

identify it. Because of that, he stresses the difficulty of conducting empirical research in order to determine which ones could be identified as threshold concepts. Moreover, Rowbottom (2007) argues that the element of transformative knowledge cannot be exclusively ascribed to a particular set of concepts as any concept, according to him, could have some element of transformative learning. He illustrates his argument with the example of traffic lights and how knowledge of their purpose leads to a whole new experience and a shift in drivers' understanding of why other drivers abide by the law. O'Donnell (2009) advocates the arguments presented by Rowbottom (2007) by pointing out that the notion of threshold concepts still has many shortcomings which make it problematic to identify such concepts. He also criticises the use of words *likely* and *probably* which opens the door to different interpretations due to the fact that "the purpose of a theoretical definition is to be definitive rather than conditional" (p. 192). Rowbottom (2007) presents another argument by showing how difficult it is to separate concepts from abilities as any given concept is supposed to be reducible to a peculiar set of abilities" (p. 265). He points out that Meyer and Land interpret threshold concepts as mental representations, whereas concepts can also be defined as abilities due to the fact that "clusters of concepts … are clearly necessary for some abilities" (p. 265). The last point raised by Rowbottom can hold its ground in disciplines that require learners to master, along with understanding concepts, a set of basic abilities and skills such as teacher education. For instance, teachers having only the theoretical knowledge of pedagogy and no skills in teaching cannot be considered as good teachers, and the same argument goes for doctors. Despite the critique presented by Rowbottom (2007) and O'Donnell (2009), the notion of threshold

concepts has kept attracting more researchers, and its literature has continued to grow considerably.

From the characteristics of threshold concepts, we have come to know that what makes knowledge really powerful is when it influences ways of thinking and practising. A person who shows passive interaction with knowledge will not be able to experience any epistemological and ontological change. However, such a change does not come easily as transformative learning is highly likely to be troublesome. Meyer and Land (2006) explain that “if knowledge is to have a transformative effect it probably should be troublesome, or at least troubling” (p. xiv) Therefore, they acknowledge the powerful effect of troublesome knowledge as proposed by Perkins (2006). The next section casts light on troublesome knowledge within the context of threshold concepts.

2.2.1.1 Troublesome Knowledge

Studying at tertiary level exposes students to a variety of “specialised knowledge, skills and understanding that together comprise the basis of expertise within a particular discipline” (O'Brien, 2008, p. 303). It is assumed by many stakeholders such as curriculum designers and teachers that students will easily acquire the target objectives that are clearly stated in the curriculum. However, most students are highly likely to face many difficulties in understanding some crucial concepts in their disciplinary subject matter as knowledge is not comprehended in a linear way, but is understood after a cognitive struggle with it. Perkins (2006) describes this problematic encounter that emerges from trying to have a full understanding of knowledge as ‘troublesome knowledge’. Exploring the notion of troublesome knowledge, he defines it as the type of knowledge that is counter-intuitive, alien or incoherent.

According to him, troublesome knowledge takes form when knowledge is ritual, inert, conceptually difficult, foreign or alien and/or tacit. Ritual knowledge, as suggested by Perkins, is the knowledge that has become ritualised in our mind without too much thinking about it. It even becomes meaningless and, therefore, we find it hard to explain when we are asked about it. As for inert knowledge, he means the knowledge that is passively kept in our mind without using it to make connections to the world around us. It is saved as isolated pieces of knowledge and is only retrieved when we are tested. This type of troublesome knowledge is common amongst students, who use knowledge for exam purposes, but are unable to connect it to the real world. Perkins describes the kind of knowledge that is strange and against everyday experiences as conceptually difficult. In other words, some knowledge tests and shakes our belief system that we have formulated while growing up. For instance, the phenomenon of a solar or lunar eclipse is still conceptually too difficult for people to understand who still believe the earth is the centre of the universe and the sun revolves around it. As for foreign or alien knowledge, it becomes troublesome due to the fact that it is unfamiliar to us because it is culturally, politically and socially different. A good example would be the term ‘democracy’ in a country ruled by the military. In addition to Perkins’ kinds of troublesome knowledge, he acknowledges what Meyer and Land (2006) suggest that ‘tacit knowledge’ is another type of troublesome knowledge. This kind of knowledge is subconsciously formed and reformed until it becomes troublesome. In other words, it is too difficult to explain or be aware of its theoretical backgrounds. A good example to illustrate this would be university professors teaching Maths to young learners.

Due to being confronted by the five kinds of troublesome knowledge, many students usually find themselves ‘stuck’ in a conceptual state that is called

‘liminality’, or ‘liminal state’. The following section discusses the concept of liminality and how important it is for crossing threshold concepts.

2.2.1.2 Liminality

The process of acquiring knowledge which is troublesome and crossing a threshold concept is not an easy process. Students usually get cognitively ‘stuck’ in a liminal state, or liminality, before they move forward to crossing a threshold concept. As defined by Meyer, Land, and Baillie (2010), liminality is “a suspended state of partial understanding, or ‘stuck place’ in which understanding approximates to a kind of ‘mimicry’ or lack of authenticity” (p. x). It is caused by troublesome knowledge, where students encounter difficult concepts, get challenged and try to get a full grasp of understanding them. Some students manage to understand them after considerable effort, whereas others take longer and need more effort in order to overcome those difficult concepts and cross the liminal state. Acknowledging the powerful effects of the liminal state caused by troublesome knowledge, Meyer and Land arguably emphasise:

> When knowledge ceases to be troublesome, when students sail through the years of a degree programme without encountering challenge or experiencing conceptual difficulty, then it is likely that something valuable will have been lost.
>
> (Meyer & Land, 2006, p. xiv)

This argument is supported by Cousin (2008) who also stresses the importance of learner anxiety in the process of crossing a threshold concept. She argues that “the idea of a threshold concept mastery is tied into seeing unsafety as an unavoidable part of the learner’s journey” (pp. 263-264). In other words, during their stay in the liminal space, learners feel unsafe, uncomfortable and anxious,

and the process of getting stuck in the liminal space is quite unsettling and stressful (Cousin, 2008; Meyer & Land, 2006; Meyer et al., 2010). Caused by liminality, crossing threshold concepts is unsettling and stressful due to the fact that it is the place where learners experience transformational learning (Land & Meyer, 2010) which forces them to go through “an uncomfortable shift in identity” and “a sense of loss” (Meyer et al., 2010, p. x). As the nature of interacting with troublesome knowledge in order to experience knowledge transformation is quite unsettling, especially when students get stuck in the liminal space for a long time, it might be seen as a serious problem. However, the constant attempts at overcoming troublesome knowledge can actually be seen as a way of preparing oneself for transformational learning (Savin-Baden, 2008). Furthermore, getting stuck in the liminal space while using different strategies to overcome troublesome knowledge could be rewarding, as it may lead learners to become independent learners who will be able to cross any threshold concepts in their journey to experiencing ontological change (Cousin, 2008; Orsini-Jones, 2010). Not only do learners experience ontological shift, but they also “can understand, manipulate, and create knowledge” when they cross threshold concepts (Kiley & Wisker, 2010, p. 399). Such crossing, as Kiley and Wisker (2010) conclude in their research on doctoral students’ conceptual challenges, indicates “a shift, a change, in the learner’s appreciation and understanding of her/himself as well as what has been learned” (p. 412). They stress the importance of the ontological and epistemological impact on learners who cross threshold concepts.

Threshold concepts are not only troublesome for students to learn, but also teaching them is not as easy a task as it may seem (O'Brien, 2008). As threshold concepts are characterised by troublesome knowledge which causes

difficulties for students learning them, they may cause difficulties for instructors teaching them. Instructors who are not aware of the kinds of troublesome knowledge will find it difficult to help learners understand those concepts, especially the ones who get stuck in a liminal space. Though they are difficult to learn and difficult to teach, threshold concepts need to be addressed by two important questions which are raised by Meyer and Land (2006, p. 9):

> *1. How might we best assist our students to gain understanding of such concepts?*
> *2. What might account for the variation in student facility to cope (or not) with these learning thresholds?*

In order to offer support to learners and help them not to become stuck in a liminal space, we need to know how the modes of variation work when they encounter troublesome knowledge and cross threshold concepts. The next section explores the modes of variation.

2.2.1.3 Modes of Variation

In their attempt to acquire knowledge, deal with troublesome knowledge and go through liminal state, most learners go through a conceptual framework of modes of variation. Land and Meyer (2010) define variation as “the extent or degree to which individuals vary in performance and understanding” (p. 64). According to them, the framework of crossing threshold concepts consists of “variation in the spaces occupied in a student’s journey towards, through and beyond particular conceptual gateways” (p. 63). They clarify their notion by pointing out that “variation may occur … within conceptually discrete modes of preliminal, liminal and postliminal episodes of conceptual and epistemological fluency” (p. 63). As knowledge can also be deeply and subconsciously transformed as part of learner’s way of knowing, they add a fourth mode of

variation that is called ‘subliminal mode’. This means that there are four modes of variation that learners go through when crossing a threshold concept. Table 2.1 shows the modes of variation with the processes involved.

Table 2.1 Modes of variation (Land & Meyer, 2010)

Mode of Variation	**Processes involved**
1. Preliminal	How learners perceive potential threshold concepts
2. Liminal	How learners enter or get stuck in the space
3. Postliminal	How learners exit the liminal space
4. Subliminal	How learners become aware of knowing

As Land and Meyer (2010) point out, preliminal variation deals with “how the portal initially ‘comes into view’, how it is initially perceived or apprehended, and with what cognitive and ontological mindset it may therefore be apprehended or withdrawn from” (p. 63). After learners initially interact with a new threshold concept comes the second stage, liminal variation, where the process focuses on “how the portal, that is the liminal space itself, is entered, occupied, negotiated and made sense of, passed through or not” (p. 63). Clearly, this mode of variation is probably the most crucial one as many learners are highly likely to ‘get stuck’ because of the effect of knowledge transformation there. When learners manage to get through the liminal space, they enter the postliminal mode of variation where there is “a new conceptual space, and the epistemological and ontological terrain encountered from that point onwards” (p. 64). Because of the engagement and interaction with threshold concepts in these different modes of variation, knowledge becomes a part of a learner’s cognitive system in the subliminal mode of variation. This mode is basically “the

extent of students' awareness and understanding of an underlying game or episteme- a 'way of knowing'- which may be a crucial determinant of progression (epistemological or ontological) within a conceptual domain" (p. 64). As learning in the form of acquiring knowledge is fundamentally based on stages of cognitive development, Meyer and Timmermans (2016, p. 28) believe that "troublesome threshold concepts can unlock developmental progressions", which, one can argue, lead learners to enter the subliminal mode of variation; in other words, a developmental zone of an initial professional identity that belongs to a discipline.

The previous sections have discussed threshold concepts from a theoretical point of view. It is worthwhile to look into research on threshold concepts in order to see how threshold concepts have been identified in different disciplines.

2.2.2 Research on Threshold Concepts

Since Meyer and Land introduced threshold concepts in 2003, there has been a significantly growing body of research identifying threshold concepts in many different disciplines, some of which have been carried out on Economics (Reimann & Jackson, 2006), Biology (Taylor, 2006), Computer Science (Shinners-Kennedy, 2008), Electrical Engineering (Carstensen & Bernhard, 2008), Geology (Cheek, 2010), Philosophy (Cowart, 2010), Medicine (Wearn, O'Callaghan, & Barrow, 2016), and Legal Practice (Dickie & Galen, 2016). Research literature on threshold concepts shows that a wide range of data collection tools and research design procedures have been implemented. In addition, there is a mixture in selecting participants using top-down and bottom-up approaches. The former begins with experts who are first asked to provide a list of what they identify as threshold concepts, and then the list is given to

learners in order to reflect on and express their ideas and experiences (Reimann & Jackson, 2006; Thomas et al., 2010). The latter focusses first on students' experiences and thoughts on the transformative, integrative and troublesome features of potential threshold concepts (Cheek, 2010; Taylor, 2006). For both top-down and bottom-up approaches, most researchers prefer to use qualitative data which help them explore and draw on students' accounts and experiences to suggest concepts that could be identified as threshold concepts.

However, due to the fact that threshold concepts have attracted so many researchers from different educational backgrounds, O'Donnell (2010) questions the integrity of the research literature about threshold concepts. He argues, "The literature displays an uncontrolled tendency to regard any threshold, barrier or difficulty in learning as linked to the presence of a threshold concept" (p. 5). He further argues that threshold concepts seem to be so appealing to many researchers, and this drives them to suggest threshold concepts even "in the absence of coherent definitions and identification criteria" (p. 7). Therefore, it is important to have a critical look at some empirical research that has investigated potential threshold concepts in different disciplines.

One of the early investigations of threshold concepts was research carried out in economics conducted by Reimann and Jackson (2006). They carried out their research in a post-1992 UK university targeting first-year introductory microeconomics students. They collected data using pre and post-tests, interviews and a questionnaire. Their aim was to investigate whether students' thinking on everyday life situations had changed as a result of being taught about threshold concepts in their module. In the first phase of their research, they interviewed several university teachers in different institutions in order to

identify possible threshold concepts in economics. In phase two, 17 students at the beginning of their course were given two questions about McDonald's and mobile phones and asked to write their answers. For seven weeks, students were introduced to some threshold concepts related to economics. After that, the researchers conducted individual interviews with nine students addressing the two questions used in the pre-test. After data had been thematically analysed, Reimann and Jackson interviewed the module instructor on students' responses, followed by a questionnaire on conceptual content. At the end of the module, the same two questions about McDonald's and mobile phones were given to six students (post-test), followed by an interview about their experiences of the module and threshold concepts. The researchers completed their research by conducting a final interview with the module instructor on threshold concepts. Riemann and Jackson concluded that opportunity cost and elasticity are threshold concepts in economics. Taking a critical look at Reimann's and Jackson's research, it could be said that they approached the identification process of threshold concepts in a very sophisticated manner (internal validity) as their research design shows. However, the small number of participants (6 students remained until the end of the study) does not support the external validity of their research and their results cannot be generalised.

Taylor (2006) carried out research attempting to identify threshold concepts in biology. She targeted seven academics in four universities in Australia and the UK where 1000 students enrolled in first-year Biology courses participated in the study. With the help of those seven academics, students at the beginning of the courses were introduced to the concept of hypothesis and given a scenario of an ecological observation. Then they were asked to work in groups and do two things: first to explain the observation through creating a model to make a

hypothesis based on the model that could be tested. In one of the final exams, students were given another ecological scenario and asked to create a hypothesis. Based on the analysis of 200 answers, Taylor concluded that hypothesis creation and scale could be identified as threshold concepts. In Taylor's (2006) research, the large number of participants provided substantial research findings that could be generalised. However, the research design shows an unsystematic approach in which the first ecological scenario was given in a regular class and students worked in groups, whereas the second one was given in a formal exam and students worked alone. As the settings are different, the findings could not be compared and contrasted due to the fact that students' responses were highly likely to be influenced by other extraneous factors. Also, the lack of interviews might have affected the level of authenticity due to the absence of students' narratives and personal experiences through spoken discourse.

Threshold concepts on geology were researched by Cheek (2010). She targeted eighth graders, eleventh graders and 12 university students in the USA in her attempt to identify that deep time is a threshold concept. She used a three-round research design. In the first round, participants were shown a series of six animated layers with different colours and different sizes filling up one after the other, and were asked to decide the different times that it took for each layer to fill up each other. Then participants were given numbers (1,000 years, 100,000 years, 1 million years, and 100 million years) and were asked to put these numbers on a timeline. For the third round, the researcher asked participants to answer questions related to the time estimation of how long certain events take to occur such as mountain formations. Cheek concluded that deep time is a threshold concept. Based on the data collection tools and the lack

of interviews, it can be argued that the study lacks some fundamental aspects of research integrity. The research seems to test intelligence and logic rather than knowledge of threshold concepts.

Thomas et al. (2010) conducted research on identifying threshold concepts in computer science in Europe and the USA. Their data collection tools consisted of unstructured and semi-structured interviews, questionnaires, concept maps and student biographies. They started their research by interviewing 36 educators on potential threshold concepts in computer science at two international conferences. Those interviewees were first given questionnaires, but only five responses were collected. Based on the interviews and questionnaires, the researchers reported that 33 concepts could be identified as potential threshold concepts. Then semi-structured interviews were conducted with 16 four-year students at seven institutions in three countries and the main focus was on threshold concepts and liminality. The researchers asked 107 participants (71 novices, 12 intermediate students, 15 graduating students and 9 instructors) from six institutions in three countries to draw concept maps focussing on integrative element of concepts. Finally, 86 students from five institutions volunteered to write their biographies on the transformative effects of some potential threshold concepts that were grouped from the previous procedures. Thomas et al. concluded that object orientation, pointers, data abstraction, complexity, modularity, code reuse and design pattern are considered to be threshold concepts in Computer Science. As described, Thomas et al.'s research seems to be well designed and well executed with multiple data collection tools implemented in many different contexts and with a large number of participants. It can be argued that the level of internal as well as

external validity is quite high, and their findings could be generalised in similar contexts.

The studies discussed above show that there is no unified, systematic research approach to identifying threshold concepts. Arguably, having different research approaches may have many advantages, some of which are: 1) more flexible research procedures to suit researchers and participants, 2) the use of different data collection instruments such as student interviews, reports and biographies, and 3) similar results obtained from different research methods. On the other hand, there are some disadvantages that could have stemmed from using a wide range of different research procedures, which are: 1) no control on data collection tools, 2) the lack of using more effective data collection tools, 3) dependency on a small number of participants, and 4) tendency to claim the target concepts as threshold concepts. Therefore, Quinlan et al. (2013, p. 586) show their concern about the lack of "a fully fledged research methodology" when researching threshold concepts. Sensing the disadvantages of uncontrolled research and attempting to systemise research on threshold concepts, Cousin (2009) proposes an analytical framework for identifying threshold concepts called transactional curriculum inquiry. It consists of three stages as follows:

1. Focus group with academics
2. Documentary analysis
3. Interviews with students

(Cousin, 2009)

Another important point to make is that most research on threshold concepts treats learners as "objects of study' rather than 'partners in these inquiries" (Felten, 2016, p. 3). Using a top-down approach where course designers or

tutors make a list of threshold concepts for learners to respond to might not reveal substantially authentic data. In other words, it can be argued: Do we really explore the actual experiences that students face when encountering any threshold concepts as they see them away from any influence when we give learners a list to choose from? As learners are the ones who encounter, experience and interact with threshold concepts, we could have a better understanding of threshold concepts if we invite students to share their true experiences with threshold concepts as they see them, or even invite them to be "partners with us in our research and practice" (Felten, 2016, p. 7).

As this research study is about identifying threshold concepts in teacher education, it is important to discuss research conducted on teacher education in a separate section within the context of teacher education and teacher identity (see 2.6.2.2). Therefore, after presenting some research investigating threshold concepts in different disciplines, the next section discusses some issues related to threshold concepts.

2.2.3 Issues Related to Threshold Concepts

The complexity of identifying threshold concepts leads us to face a number of issues that need to be addressed. Even though Meyer and Land conceptualise the characteristics of threshold concepts, they do not attempt to give a precise definition of 'threshold concepts' that could enable instructors and learners to decisively distinguish between a threshold concept and a core concept within a specific discipline. Because of that lack of clear definition, it leaves the concept of knowledge of where the threshold concepts of a specific discipline are oriented around open to many different interpretations by curriculum designers, teachers as well as students (Rowbottom, 2007).

Another major issue is how to identity threshold concepts. It seems there is no identification protocol or procedure suggested by Meyer and Land to follow in order to clearly identify threshold concepts. Such a lack of protocol has led many researchers to overgeneralise many concepts as threshold concepts. In their research, White, Olsen, and Schumann (2016) identified a set of 20 potential threshold concepts within a First Year English Composition course. However, they found that the majority of First Year students were comfortable with most of the concepts and did not find them either troublesome or transformative. This mismatch of identifying potential threshold concepts between the students and the researchers with the course designers and instructors in the previous study opens the door to a critical argument against the claims to identifying threshold concepts in a discipline. Furthermore, most threshold concept research is based on the accounts of a few participants such as the research done by Moroney, Mckendry, and Devitt (2016) which is based only on three pre-service teachers.

Another critical look at Meyer and Land's conceptual framework of mode variations shows us that there is no clear discussion of how students actually go through these modes in the process of crossing the liminal space. It can be argued that the 'how', as much as the 'what', is also problematic. In other words, students who get stuck with troublesome knowledge are highly likely to get stuck at how to find effective metacognitive, self-regulation strategies in order to move along the variation modes. As Vermunt (1998) points out, “Regulation of learning implies directionality: students employ regulation strategies to direct their processing of subject matter” (p. 152) . Therefore, it is not enough to only observe students move from one variation to another. We also need more

investigation into the strategies which students use if we really want to explore in depth how students make progress through the modes of variation.

A final issue here is the characteristic of troublesome knowledge. It appears that there should have been sub characteristics related to troublesome knowledge in order to conceptualise the threshold concepts in a more manageable framework for the tertiary education context. As discussed earlier, a key feature of a threshold concept is that it is troublesome, and thus it creates a space of liminality. A very important question should be asked here: what if that liminality is impossible or at least too difficult to cross by the majority of students? Will it be considered as a threshold concept even though only a handful of learners will be able to cross it and experience transformational impact? It would seem that for the ontological change experienced by university students, a handful of students who are able to successfully cross liminality are not a sign of a well-designed curriculum that fairly and equally presents subject knowledge to students. The main educational target at tertiary education is not to have a few 'super' undergraduates, but rather to guide, facilitate and support students to experience change in their ways of thinking, their interaction with knowledge and their views of the world through transformational learning. Having said that, we could argue that no matter how difficult and problematic a threshold concept is, it should eventually be discernible and cognitively accessible. In other words, students should eventually be able to discern and understand the target threshold concept while attempting to cross the liminal space. By characterising a threshold concept as eventually discernible, it still does not mean a full grasp of the concept. It is a phase in which students are triggered to make their first move towards crossing the liminal space. Yet, it is still cognitively not enough to do the 'crossing' out of that complex liminal space.

Therefore, there should be another characteristic of a threshold concept that gives students a little push and that feature could be suggested as cognitively accessible. This characteristic could be described as a phase where students are able to make sense of what they are missing

Though threshold concepts have some issues that need to be addressed, they are still considered a good conceptual framework for organising and presenting knowledge in a more meaningful and coherent way to improve ways of thinking and practising in a discipline (Davies, 2006). The previous sections attempted to discuss the literature on threshold concepts; however, we cannot get a full picture of the context of threshold concepts without looking at other theories and notions that are related to Meyer and Land's threshold concepts. One of the most important points that should be explored is: what do we mean by knowledge? The following discusses the conception and construction of knowledge.

2.3 Conception and Construction of Knowledge

The notion of threshold concepts, as proposed by Meyer and Land (2003), deals with 'powerful knowledge' that helps learners experience transformational learning epistemologically and ontologically. Instead of taking powerful knowledge for granted, the term *knowledge* needs to be explored so that we could contextualise threshold concepts in the knowledge domain. Arguably, the question about the definition of knowledge is quite problematic and troublesome. If we ask this seemingly easy yet complex question to a group of people, it is highly likely that we receive different answers based on their different experiences and levels of thinking. The conceptualisation of knowledge is

influenced by the relationship of epistemology (nature of knowledge) and ontology (nature of being). As Britzman (1991, pp. 23-24) explains:

> Each of our images of what constitutes knowing, and hence knowledge, is part of what structures one's subjectivity: what is valued as truth or discarded as fiction, how one defines her relationship to the world and to others.
>
> (Britzman, 1991)

For instance, some people might define knowledge in a broad sense as learning anything new regardless of the level of cognitive processing operations. An example of this conception is the memorisation of the capital cities of a group of countries. On the other hand, others will argue against that surface representation of knowledge as it does not require higher thinking skills. According to them, knowledge should be attached to learning something new that requires thinking skills such as learning calculus in maths. In other words, there should be some cognitive operations taking place when receiving new information. With the development of our societies and the rise of higher education, educators are in favour of knowledge that requires higher processing skills taking place in our cognitive capacity and that has an impact on us cognitively, emotionally and attitudinally. Ontologically, this representation of knowledge is processed in our cognitive system with a high degree of emotional interaction that enables us to open our eyes to see the world differently and understand our positions and contributions in our world.

Epistemologically and ontologically, it appears that knowledge cannot be defined; however, it can be characterised and classified. Hattie and Yates (2014) classify knowledge into five layers. The initial layer starts with 'sensory recognition' which receives pieces of information (usually isolated) through our

sensory experiences. A good example of this basic knowledge is the recognition of the differences between shapes. The second layer of knowledge is called ‘strings’ in which pieces of information are ordered and associated in order to present a pattern such as basic calculus. The third layer conveys the real level of complex knowledge in the form of ‘ideas’. Hattie and Yates point out that “the notion of ideas implies linkages at the level of conceptual meanings rather than simple strings” (2014, p. 129). In other words, ideas interact with concepts in order to process and construct meaning. A good example of the layer of ideas is the meaning of happiness. The fourth layer of knowledge is termed ‘schemata’. With schemata, we are able to structure and organise what we know in a more meaningful way. We communicate with deep thinking in order to create deep meanings. According to Hattie and Yates (2014), we depend on our schemata to make sense of the ideas we receive; otherwise, those ideas would appear as “isolated islands of knowledge” (p. 130). One example of using schemata is when we make sense of the cause and effect of air pollution. Without prior knowledge of the danger of chemicals emitted from factories, we would not be able to see how the air could be polluted. Finally, the fifth layer of knowledge is characterised by ‘mental models’. With this layer of knowledge, our mind is equipped with the ability to interpret abstract concepts and interact with deeper thinking to explore deeper meanings. Because of this highly complex level of knowledge, we tend to activate all relevant schemata. As Hattie and Yates explain, extended development of evolution theory is a good example of a mental model. Table 2.2 summarises the five layers of knowledge.

Table 2.2 Layers of knowledge (Hattie and Yates, 2014)

Layers of Knowledge	**Characteristics**
Sensory recognition	Information within sensory experience
Strings	Social orderings and associations
Ideas	Knowledge as propositions
Schemata	Organised and structured knowledge
Mental Models	Interpret abstract concepts for deeper meanings

The most important point which could be understood from the discussion above is that knowledge cannot be interacted, organised and produced in an isolated manner as “learning proceeds quietly and efficiently when what is new builds directly upon what is already secured” (Hattie & Yates, 2014, p. 126). Therefore, Hattie and Yates (2014) argue that presenting disconnected pieces of knowledge causes what they term ‘islands of knowledge’ instead of “a richly interconnected network of meaningful associations” (p. 130). That is why, according to them, organizing knowledge in the form of schemata is very effective for easy access to making sense of ideas, facts and concepts. They also argue that new information is filtered and processed by our existing knowledge regardless of whether our new understanding is correct or not. Arguably, we could point out that what learners receive as knowledge from instructors does not necessarily create the understanding instructors aim to achieve. In other words, organising knowledge in meaningful contexts is not a collective process which all learners will experience. Rather, it is an individual experience that course designers, educators and instructors need to explore in-depth to facilitate the individual construction of knowledge.

As discussed earlier, knowledge cannot be limited to one form as it comprises different layers based on the level of understanding and how ideas are stored in our minds. Some layers of knowledge do not require deep thinking, whereas others require deep thinking and understanding. Within the context of threshold concepts, it is understood that threshold concepts represent the mental models in the framework of knowledge layers suggested by Hattie and Yates (2014) as their transformative effect helps learners experience deeper meanings for better understanding. Deeper meaning for better understanding requires construction of knowledge.

Before shedding some light on how knowledge is constructed, it is important to have a better understanding of the types of knowledge first as outlined in the following section.

2.3.1 Types of Knowledge

Hattie and Yates (2014) classify two types of knowledge which are procedural knowledge and declarative knowledge. According to them, the former is generated by 'hands-on experiences' whereas the latter is formulated by sensory recognition, strings, ideas, schemata and mental models. In other words, procedural knowledge deals with first-hand experiences based on observation, learning by doing and trial and error. On the other hand, with declarative knowledge, there is a sense of epistemological development based on the layers of knowledge, where mental models represent the highest layer. Accordingly, declarative knowledge requires formal education in order to guide and support students' learning through the layers of knowledge. It is clear that threshold concepts deal more with declarative knowledge rather than procedural knowledge.

In his attempt to classify knowledge, Perkins (2008) categorises knowledge into three types: possessive, performative and proactive. Possessive knowledge, according to him, is the type of knowledge that is ultimately based on memorising or gathering information. As for performative knowledge, it is the knowledge which enables us to do tasks without extending its application to other contexts. It is to show knowledge-originated performance within its context, and it is quite common in educational settings. On the other hand, proactive knowledge, as Perkins points out, “emphasises what we do with what we know not only within but outside settings of formal study” (p. 8). He argues for proactive knowledge to be targeted in learning because it produces understanding and can be used in different contexts. This type of knowledge that involves knowledge transfer, according to Perkins, is what learners should acquire. It is assumed that such transfer of knowledge to other contexts usually has “strong emotional and motivational dimensions” (Perkins, 2008, p. 13), through which learners construct and build up more new knowledge. The process of constructing new knowledge based on the transfer of knowledge requires a learning context where proactive knowledge and ways of thinking are actively engaged.

Therefore, Perkins (2008) argues in favour of threshold concepts proposed by Meyer and Land (2003) because “knowledge structured around threshold concepts becomes richer and more meaningful, a contribution to engagement” (p. 13). There is no question that threshold concepts with the characteristics of being transformative and integrative can engage learners in a learning context that goes beyond the merely specific understanding of a concept. Hence, students learn to construct meaning in different contexts rather than showing

performative knowledge to impress teachers and gain marks. The following section discusses the importance of learning for constructing knowledge.

2.3.2 Learning for Constructing Knowledge

The concept of learning was traditionally viewed as “a stable change in behaviour or thinking …that does not take account of … the personal, affective component which becomes attached to concepts such as learning” (Entwistle & Peterson, 2004, p. 408). Traditionally, students were viewed as passive learners who were spoon fed with knowledge and expected to acquire knowledge as it was received. Such a traditional view does not hold ground any longer. As learning takes place, learners engage and interact with knowledge academically as well as personally. Acquiring knowledge is only the outcome before which there is a complex network of knowledge construction as it involves construction of knowledge, intake of knowledge and use of knowledge (Vermunt, 1998). Construction of knowledge is not only a cognitive process but is also facilitated by strong emotions as “the manner in which an individual interacts with knowledge is emotionally charged” (Blackie, Case, & Jawitz, 2010, p. 641). In their attempt to explain how knowledge is constructed, Hattie and Yates (2014) point out that unorganised, disconnected data are too confusing to make sense; accordingly, the mind finds it too difficult to construct coherent knowledge from them. According to them, the mind finds it easier to cope with “coherently organised existing knowledge” (p. 115). That is the reason why Britzman (1991) expresses her concern when she argues that “when knowledge is reduced to rigid directives that demand little else from the knower than acquiescence, both the knower and knowledge are repressed’’ (p. 29).

Vermunt (1998) suggests that learning for knowledge construction can be enhanced by cognitive processing activities. As he explains, students need activities that promote their thinking skills in order to make sense of, interact with and process the learning experiences they encounter which will lead to better understanding of the knowledge and skills they receive. In order to achieve that, students, according to Vermunt, are required to apply some metacognitive regulation activities. These activities help students regulate their learning and understanding which could result in better learning experience. Some of the metacognitive regulation activities are planning what and how to learn, monitoring learning progress by using a checklist, and diagnosing problems of understanding and finding other alternative ways to overcome difficulties students face during their learning. Vermunt (1998, p. 168) concludes:

> To activate relating and critical processing strategies it is probably more effective … to teach students to use a self-regulated strategy, coupled with measures to influence the mental learning model of students in the direction of a knowledge-constructing view.
>
> (Vermunt, 1998, p. 168)

Based on what has been discussed, we can argue that crossing the liminal space throughout the four modes of variation is a process of constructing knowledge in a meaningful context. Indeed it requires metacognitive regulating skills and strategies that learners should be aware of and trained to use. As critiqued in section 2.2.1.2, moving through modes of variation (the how) has not been thoroughly investigated or discussed by Meyer and Land, and it is an area which needs more attention. The metacognitive regulation strategies suggested by Vermunt (1998) could be incorporated if we have a curriculum based on threshold concepts in order to help our students cope

with troublesome knowledge and cross the liminal space. However, metacognitive regulation strategies are fundamentally influenced by learners' conceptions of and orientations to learning which are discussed in the following section.

2.4 Conceptions and Orientations of Learning

Many teaching materials and textbooks present learning as a linear process in which students are expected to show continuous progress in cognitive understanding, knowledge construction and mastery of skills. They treat students as if they share the same background, the same schemata, the same cognitive capacity and the same learning goals. However, following on what we have explored in the previous sections on how learning takes place and how knowledge is constructed, we could argue that learning is a process that is cognitively, emotionally and pragmatically characterised by students' conceptions of and orientations to learning (Beaty, Gibbs, & Morgan, 1997; Entwistle & Peterson, 2004; Vermunt, 1998). Entwistle and Peterson (2004) clarify that learners' conceptions of learning are shaped by political, economic and cultural contexts, and they are developed through students' experiences of the circumstances and contexts they live in. In other words, learners' conceptions of learning are not static, but are formed and reformed by the changing macro and micro contexts. For instance, a society with a competitive job market valuing problem-solving skills would lead university students to perceive learning as gaining cognitive skills such as critical thinking and evaluation. On the other hand, if there is another society with a competitive job market focussing on handicrafts, many students would see learning as a tool for creating objects.

Based on their conceptions of learning, students create learning orientations during the actual process of studying. Learning orientations are defined by Beaty et al. (1997) as “the collection of purposes which form the personal context for the individual student’s learning” (p. 76) In addition, we can argue that it is not only the collection of purposes, but the conception of learning is also formulated by “all those attitudes and aims which express the student’s individual relationship with a course of study and the university” (Taylor et al., 1981, quoted in Beaty et al. (1997, p. 76)). Alongside purposes and attitudes, Vermunt (1998) defines learning orientation as “the whole domain of personal goals, intentions, motives, expectations, attitudes, worries and doubts of students doing courses or studies” (p. 151). It can be said that learning orientation outlines the whole experience of engaging with learning and achieving success; therefore, it is “the personal context to studying” (Entwistle & Peterson, 2004, p. 413). Based on their research with Open University and Surrey University students, Beaty et al. (1997) propose, four types of students’ learning orientations: vocational, academic, personal and social. The four types are summarised in Table 2.3.

Table 2.3 Student's learning orientations (Beaty et al., 1997, p77)

Orientation	Interest	Aim	Concerns
Vocational	Intrinsic Extrinsic	Training Qualification	Relevance of course to future career Recognition of qualification
Academic	Intrinsic Extrinsic	Intellectual interest Educational progression	Choosing stimulating lectures Grades and academic progress
Personal	Intrinsic Extrinsic	Broading or self-improve-ment Compensation or proof of quality	Challenging interesting materials Feedback and passing the course
Social	Extrinsic	Having a good time	Facilities for sport and social activities

Whatever their learning orientation is, students aim to achieve what they want from their learning experiences; as a result, they develop learning strategies that can help them achieve their goals (Beaty et al., 1997). It is obvious that learning orientations have a great influence on what students aim to get from studying at higher education institutions. Therefore, it is important to note that they may not remain as they are during the students' progress in their studies. Students may change their learning orientations as they reposition their learning experiences, evaluate again their learning goals and see other opportunities (Entwistle & Peterson, 2004).

A link between students' orientation to learning and threshold concepts could be drawn here. As discussed in section 2.2, it has become clear that

threshold concepts possess transformational power that takes students to another level of understanding themselves and the world around them, based on the transformational journey through the modes of variation. Crossing the liminal space requires students to use many different strategies suitable to the degree of difficulty. Arguably, those strategies are basically the manifestations of students' orientations to learning. Some students may see learning as a social experience and, therefore, prefer working with others or seeking help from others. Others may see it as academic excellence so they will largely depend on themselves to plan and regulate their learning. Furthermore, learning orientations can reveal why some students get permanently stuck in the liminal space of threshold concepts. Although the epistemological difficulty of some threshold concepts plays a big part, learning orientations can also contribute to students' inability to cross the liminal space. For instance, if a student joins a teacher education programme only to secure a job (vocational learning orientation), they may not find it important to put more effort into crossing the liminal space they are stuck in. As educators, it is important to recognise those orientations to learning if we want to fully explore and understand the effects of troublesome knowledge and liminal space on students' ontological change.

Regardless of the type of learning orientation students may have, they should be trained on how to reflect and think critically on their progress (Brookfield, 1987; Liu, 2015). The next section discusses critical reflection in more detail.

2.5 Critical Reflection

It is known that crossing a threshold concept requires many cognitive and emotional efforts. As a result, transformational effects do not occur while

students are passive and are not involved in interacting and processing new knowledge. Furthermore, the pursuit of acquiring knowledge is fundamentally a process that requires many higher cognitive processing skills. It is not enough to assume that asking students to apply ‘specialised knowledge’ to well-defined activities and tasks will create a learning environment supported by simplicity, stability and certainty (Schön, 1983). Practice is only a small, practical part that can be seen out of understanding the specialised knowledge as an outcome. Underneath it, there is a complex network of epistemological connections that formulate and affect practice.

Therefore, we could argue that practice is basically based on our tacit knowledge because “our knowing is ordinarily tacit, implicit in our patterns of actions in our feel for the stuff with which we are dealing with” (Schön, 1983, p. 49). Schon calls it ‘knowing-in-action’, which he defines as the “characteristic mode of ordinary practical knowledge” (p. 54). In a context full of variables and uncertainty such as learning, he argues that practitioners tend to use ways which are systematic to overcome problematic situations they face during their practice. He refers to this kind of problem-solving engagement as ‘reflection-in-action’. According to him, this cognitive process “tends to surface not only the assumptions and techniques, but the values and purposes embedded in organizational knowledge” (p. 338). Therefore, reflection could be roughly defined as “a conscious, thoughtful, purpose-related process” (Baird, 1992, p. 39), which requires “a systematic enquiry into one’s own practice to improve that practice and deepen one’s understanding of it” (Lucas 1991, quoted in McIntyre (1993, pp. 42-43). It is argued that reflection “views professional development as a more complex process that requires change in deeply held action theories” Osterman and Kottkamp (2004, p. 14). Hence, we can argue that reflection is

not only the cognitive process of using higher cognitive skills, but also it "involves values, attitudes and belief" as explained by Calderhead and Gates (1993, p. 2). To be able to reflect, according to them, is to be able to value what we have in terms of beliefs and attitudes. Because of that, reflection is considered an effective tool to help us change because it is so demanding and disturbing to go through the experience of personal change (Baird, 1992). Whereas Schön (1983) uses 'reflective practitioner' to describe professional people interacting with their subject knowledge, Brookfield (1987) uses the term 'critical thinker' for people who are able to think critically and give reasoned judgements. He proposes four components of critical thinking, without which a person cannot reach the point where they are described as 'critical thinkers'. These four components of critical thinking are presented in Table 2.4.

Table 2.4 Components of critical thinking (Brookfield, 1987, pp.7-9)

Components of Critical Thinking	
1	Identifying and challenging assumptions is central to critical thinking
2	Challenging the importance of context is crucial to critical thinking
3	Critical thinkers try to imagine and explore alternatives
4	Imagining and exploring alternatives leads to reflective scepticism

Based on Brookfield's components of critical thinking, it appears that the basis of critical thinking is to question ideas that are taken for granted and search for other ways of thinking. Critical thinking is needed in higher education where students are constantly subject to uncertainty and their assumptions of learning are always tested. At certain points, they may even see their belief system around learning collapse as it probably clashes with how learning at higher

education actually takes place and how it challenges what they have taken for granted.

Combining the two terms of reflection and critical thinking in what she calls critical reflection, Liu (2015) suggests two factors to be taken into account when reflecting. The first is “the cognitive process of analyzing, questioning, challenging, critiquing and acting upon the reflective insights”, and the second is “the content being analyzed, questioned and critiqued” (p. 144). Therefore, she defines critical reflection as:

> a process of constantly analyzing, questioning, and critiquing established assumptions of oneself, schools, and the society about teaching and learning, and the social and political implications of schooling, and implementing changes to previous actions.
>
> (Liu, 2015, p. 144)

Liu stresses that without critical reflection, it is difficult to experience transformational learning. Furthermore, she believes that critical reflection is a powerful cognitive tool that helps teachers re-examine and reformulate their beliefs and perceptions of teaching and learning for better understanding. Having a better understanding through critical reflection, as she explains, requires looking for different ways that can help us “challenge our prevailing ways of knowing” (p. 148).

As threshold concepts with their troublesome knowledge and liminal space always create a complex network of uncertainty, critical reflection can support learners in the process of crossing the liminal space towards transformational learning and ontological change. Learners without critical reflection will find it difficult to reposition their learning in order to make progress. They will lack the capacity to critically evaluate their current position and think ahead of alternative

ways of thinking and practising. It can be argued that critical reflection is a powerful tool for students to self-regulate their learning experiences when encountering and interacting with threshold concepts, especially with troublesome knowledge and liminality. It is important, though, to point out that not only is critical reflection guided by intrinsic factors, it is also driven by extrinsic factors such as the social context of professional identity. The following section explores this important term and how it is linked to threshold concepts.

2.6 Professional Identity

Identity in general is an integral part of a person's system of being which takes different forms and ,therefore, it is impossible to be given one specific definition that fits into different contexts (Beauchamp & Thomas, 2009). In a broader sense of meaning, Beijaard, Verloop, and Vermunt (2000) state, "Identity can generally be defined as who or what someone is, the various meanings people can attach to themselves, or the meanings attributed by others" (p. 750). Gee (2000) sees identity as a certain "kind of person within a given context" (p. 99). He argues that while one has a 'core identity', there are multiple forms of this identity as one operates across different societal contexts. From the previous points, it can be said that identity is shaped by a personal level (who a person is) and a societal and professional level (who a person is in a social/professional context). Nevertheless, as Beauchamp and Thomas (2009) argue:

> It is not easy to reach a clear definition as it is too difficult 'to comprehend the close connection between identity and self, the role of emotion in shaping identity, the power of stories and discourse in understanding identity, the role of reflection in shaping identity.
>
> (Beauchamp & Thomas, 2009, p. 177)

According to Stibbe (2011), there are two kinds of identity. The first one comes from essentialist theories which recognise identity as “a core, authentic, true identity within each of us” (p. 89). The second notion is proposed by postmodern theories “which posit multiple, fractured identities that we slip in and out of without any of them being objectively ‘us’ ” (p. 89). In a new world order that values and spreads higher education, Stibbe believes that postmodern theories of identity address the transformational aspects of learning because a person has the freedom to recreate oneself in response to the world’s changing conditions rather than having one form of identity. Linking identity to his theory of community of practice, Wenger (1998) argues that “the formation of a community of practice is also the negotiations of identities” (p. 149). He further points out that when we experience the identity of a community of practice, we basically experience a “way of being in the world” (p. 151).

As discussed in section 2.2, threshold concepts are transformative, so they help learners experience change in the way they think and in the way they see themselves (Meyer & Land, 2005; Meyer & Land, 2006). Due to the transformative shift experienced by learners, Meyer and Land (2005) emphasise that “threshold concepts lead not only to transformed thought but to a transfiguration of identity” (p. 376). In other words, the transformative nature of threshold concepts will also involve a new view into learners’ identity (Meyer & Land, 2006). Therefore, it can be argued that there is a connection between crossing threshold concepts and developing an initial professional identity as “learning is a form of identity work” (Cousin, 2008, p. 264). This argument is supported by the fact that learning is not a collection of isolated ideas, but a “process of becoming” (Wenger, 1998, p. 215), and it becomes more meaningful when it is oriented around forming an identity. In their research on threshold

concepts in economics (discussed earlier in section 2.2.5), Reimann and Jackson (2006) describe first-year students of economics approaching opportunity cost and elasticity as “thinking like economists” (p. 132). It can be argued that having the discourse of a community of practice (economists, for example) is basically a component of professional identity. As threshold concepts within a discipline pave the way for particular coherent ways of thinking and practising, Davies (2006) points out that learning becomes “an entrance into a community”; as a result, learning also becomes “an act of identity formation” (p. 71). Therefore, professional identity cannot be separated from its social context in terms of community of practice. In order to make more sense of it, a discussion is needed of how a community of practice forms professional identity and how threshold concepts could play a significant role in the formation of professional identity. The following section discusses the theory of community of practice.

2.6.1 Community of Practice

It is argued that understanding and crossing threshold concepts provide ‘ways of thinking and practising’ (Davies, 2006; Meyer & Land, 2003, 2006). The phrase ‘ways of thinking and practising’ implies processes that are accepted and used by a ‘subject community’ whose conceptions of their subject matter “bind understanding in their subject into a coherent way of thinking” (Davies, 2006, p. 70). Hence, the social aspect of threshold concepts cannot be ignored as knowledge does not appear isolated or out of context. It is thought of, formulated, organised, and discussed within a variety of different contexts, one of which is the social context of community of practice (Wenger, 1998). Wenger (1998) argues that acquiring knowledge and the process of learning are

basically a social phenomenon which could be described as “an experience of identity and a process of becoming” (p. 215). His argument is based on the following social principles:

1. We are social beings.
2. Knowledge is a matter of competence with respect to valued enterprises.
3. Knowing is a matter of participating in the pursuit of such enterprises.
4. Meaning is ultimately what learning is to produce.

(Wenger, 1998, p. 4)

Based on his social interpretation of the nature of knowledge, Wenger (1998) formulates the social theory of learning. In his theory, we are active participants “in the practices of social communities and constructing identities in relation to these communities, [and] such participation shapes not only what we do, but also who we are” (p. 4). According to him, there are four components of his social theory of learning that could be summarised as follows:

1. Meaning: Learning as experience
2. Practice: Learning as doing
3. Community: Learning as belonging
4. Identity: Learning as becoming

(Wenger, 1998, p. 4)

Based on his social theory of learning, Wenger proposes what he terms ‘communities of practice’. He believes that communities of practice are “an integral part of our daily lives. They are so informal and so pervasive that they rarely come into explicit focus, but for some reasons they are also quite familiar” (p. 7). Within the context of learning, Wegner explains that for students, “learning is an issue of engaging and contributing to the practices of their communities” (p. 7).

As for knowledge, Wenger (1998) expresses his concern when he points out that “information stored in explicit ways is only a small part of knowing, and that knowing involves primarily active participation in social communities” (p. 10). Within a community of practice, knowledge repertoire, according to him, is not static. It keeps expanding as the community of practice modifies, adds or even rejects ideas, beliefs and values. He further argues that the types of trajectories where we go through within our community of practice form and shape our identities. Through the phases of our trajectories, as he points out, we make sense of what is important for developing our professional identity within a community of practice. There are five types of trajectories suggested by Wenger (1998) which are:

1. Peripheral trajectories: access to community and practice
2. Inbound trajectories: newcomers invest
3. Insider trajectories: negotiate one’s identity
4. Boundary trajectories: value in linking other communities of practice
5. Outbound trajectories: lead out of a community, find a different position in a community, and see the world and oneself in new ways.

Wenger (1998, pp. 154-155)

It can be inferred from Wenger’s points that acquiring knowledge takes place first as a personal interaction through which a person can explore their assumptions and beliefs in order to construct meaning out of them. Then he or she moves to the next level where knowledge and learning are built up through the interaction with other people who share the same interests. After re-examining their knowledge with the help and support of others, the person is epistemologically attached to that particular community of practice that guides him or her to acquire the knowledge needed. Finally, that epistemological belonging, through more exposure and interaction to the norms, assumptions,

beliefs and values of that community, transforms into ontological association to which the person belongs and with it, gets a sense of identity.

In regard to the previous discussion, any piece of knowledge which is constructed is evaluated, approved or rejected by a community of practice. In other words, a community of practice controls what could be or could not be part of their knowledge system despite the fact that the community originally emerged because of a body of specialised knowledge. As threshold concepts are an integral part of transformational learning which results in epistemological and ontological shifts in learners' identity (Meyer & Land, 2006), there is a strong connection between the theory of community of practice and threshold concepts. Both of them do not isolate knowledge from its social context (i.e. ways of thinking and ways of practising). They also emphasise the value of constructing knowledge through which learners interact with and experience knowledge as a domain of subject matter and later as a domain of community of practice. Therefore, McCormick (2008) argues:

> If we … assume that the academic subject specialist is trying to bring students into a subject community … then a threshold concept must be seen in terms of the practices of the community.
>
> (McCormick, 2008, p. 54)

In other words, it can be argued that threshold concepts represent the conceptual framework of 'a subject community' which can be described as a preliminary phase to a community of practice. It is a phase where learners experience a shift in their identity which prepares them to belong to a community of practice at a later stage. For example, a student teacher, crossing threshold concepts in teacher education, is expected to think like a teacher when

understanding and discussing issues related to learning and teaching. However, valuing the social aspect and becoming part of a community of practice does not come easily to university students. It requires, as (Wenger, 1998, p. 215) points out, “negotiating one’s identity”, which involves interacting and testing a complex network of beliefs, attitudes and values before experiencing the power of ‘becoming’: the ontological transformation in one’s professional identity. As the discussion of professional identity goes beyond the scope of this research study, it is more meaningful to focus only on teacher identity as a relevant example of a professional identity in this research study and to see how threshold concepts could facilitate a development of initial teacher identity in teacher education as the following sections show.

2.6.2 Teacher Identity and Student Teachers

The process of becoming a teacher is complex, takes a long time and entails a development of a variety of teacher identity (Beauchamp & Thomas, 2009; Flores & Day, 2006). Teacher identity, according to Timoštšuk and Ugaste (2010), can be defined as:

> the person’s self-knowledge in teaching-related situations and relationships that manifest themselves in practical, professional activities, feelings of belonging, and learning experiences.
>
> (Timoštšuk & Ugaste, 2010, p. 1564)

It consists of a complex combination of personal beliefs, values, attitudes, practical knowledge, social factors and life experiences (Beauchamp & Thomas, 2009; Beijaard et al., 2000; Flores & Day, 2006; Lauriala & Kukkonen, 2005; Skelton, 2012; Timoštšuk & Ugaste, 2010). For the dimension of self, teachers, according to Lauriala and Kukkonen (2005), experience three types of teacher

identity which are 1) the actual self (the current one), 2) the ought self (the one recognised by society) and 3) the ideal self (the one aspired by the individual). Teacher identity is influenced by these types of self as long as teachers attempt to create and/or keep their position within the school culture and the influence of society: a contextual dimension. Addressing the self and the context, Beauchamp and Thomas (2009) argue that "identity can be viewed not just in relation to the personal dimension of the self, but also with respect to the profession itself" (p. 179). Due to the interaction between the self and the context, a teacher's identity shifts in order to create a position that fits in a particular context personally as well as professionally (Beauchamp & Thomas, 2009). According to Beijaard et al. (2000), there are three types of teacher identity as perceived of by teachers, which are 1) teachers as subject matter experts, 2) teachers as pedagogical experts, and 3) teachers as didactical experts. Teachers who see themselves as subject matter experts put more emphasis on subject matter knowledge and skills, while those who see themselves as pedagogical experts use their knowledge to support students' learning experiences. As for teachers who see themselves as didactical experts, they focus on the planning, execution and evaluation of their lessons in the classroom. As a result of the amalgamation of the self and the context, a form of teacher cognition of "what teachers know, believe and think" is firmly established and becomes too difficult to change (Borg, 2003, p. 81). The interrelated interaction between pre-teaching observation, personal biography and teaching experience makes teachers' beliefs, personal theories and practical knowledge "deeply held and are resistant to change" (Ainscow, 1994, p. 225), because they "set boundaries or frames around what we see and how we interpret experience" (Clark, 1992, p. 78). Furthermore, they work as a filter to accept or

reject new ideas and interpret new experiences (Phipps & Borg, 2009; Richards, 1998). What makes teachers' beliefs deep-rooted and firmly established is the fact that most of teachers' beliefs about teaching and learning become implicit and tacit, but still control teachers' behaviours and professional knowledge (Hoban, 2002; Phipps & Borg, 2009).

Exposed to teaching-driven context, student teachers are likely to experience and develop an initial teacher identity when they are professionally and emotionally trained to become teachers. During their teacher education programmes, they are expected to gain pedagogical knowledge that enables them to succeed in a profession that is so dynamic and is always surrounded by changing variables, contexts and uncertainty (Beauchamp & Thomas, 2009; Clark, 1992; Flores & Day, 2006). They are exposed to a variety of educational theories and concepts that help them reformulate clear understanding of what it means to become a teacher (Beauchamp & Thomas, 2009; Britzman, 1991; Flores & Day, 2006). They spend considerable time "negotiating within shifting conceptions of what teaching is or should be" (Beauchamp & Thomas, 2009, p. 185). Therefore, student teachers do not start their teacher education programme with zero knowledge of what it is required to be teachers as they already hold personal beliefs, attitudes and values about the teaching profession through years of observing teachers' actions when they were learners at school (Ainscow, 1994; Borg, 2003; Britzman, 1991; Drummond & McLaughlin, 1994; Flores & Day, 2006; Malderez & Bodoczky, 1996). Although they may have at the start of teacher education programmes "inappropriate, unrealistic or naïve understanding of teaching and learning" (Borg, 2003, p. 88), student teachers start to constantly test their teaching hypothesis and formulate their first set of established beliefs and personal theories about learning and teaching while they

study at college. After they graduate and become teachers, their set of beliefs and personal theories undergo another refining cycle of testing where some are rejected, some refined and some confirmed (Ainscow, 1994; Richards, 1998). A change in beliefs and attitudes entails transformation; however, transformative learning does not take place as easily as it might seem since most student teachers might initially resist any change that “contradicts deeply held or even cherished belief systems of the students” (Ricketts, 2010, p. 47).

Most teacher education programmes, in an attempt to equip student teachers with flexibility in changing their beliefs, values and attitudes, focus on the principles of constructivism, or knowledge construction. Roberts (1998) defines constructivist learning theory as “a cognitive process, where each of us constructs inner representations of the world, which then determine our perceptions and subsequent learning” (p. 4). In other words, it represents learning as “a process of building knowledge structures” (Mayer-Smith & Mitchell, 1997, p. 131). This knowledge construction acknowledges not only student teachers’ prior knowledge, experience and perceptions of teaching, but also their personal and emotional lives as well (Malderez et al., 2007; Roberts, 1998). It recognises that each student teacher has personal beliefs and understandings which are of great help in constructing and reconstructing knowledge in order to understand their professional identity, behaviours and then be emotionally satisfied (Roberts, 1998).

2.6.2.1. Formation of Teacher Identity and Teacher Education

The knowledge of self and the knowledge of professional context play a vital role in the process of forming teacher identity (Beauchamp & Thomas, 2009; Beijaard et al., 2000; Flores & Day, 2006; Lauriala & Kukkonen, 2005; Skelton,

2012; Timoštšuk & Ugaste, 2010). It is a process that begins with an awareness of wanting to be a teacher and ends with a transfiguration of being a teacher, through which students experience different types of teacher identity when they become student teachers, beginning teachers and experienced teachers. During these three phases, there is "an interplay between different, and sometimes, conflicting perspectives, beliefs and practices, which are accompanied by the development of the teacher's self" (Flores & Day, 2006, p. 219). Moving from unrealistic understanding of teaching by student teachers (Borg, 2003) and from idealistic expectations by beginning teachers (Flores & Day, 2006), it can be argued that the formation of teacher identity in terms of teacher perceptions, beliefs, cognition and practical knowledge starts to take shape when teachers are fully engaged in teaching and influenced by their daily teaching experiences. Therefore, Beijaard, Meijer, and Verloop (2004) define the formation of teacher identity as "a process of practical knowledge-building characterized by an ongoing integration of what is individually and collectively seen as relevant to teaching" (p. 123). Hence, the formation of teacher identity is fundamentally driven by the self and the context (Beauchamp & Thomas, 2009; Flores & Day, 2006; Lauriala & Kukkonen, 2005; Timoštšuk & Ugaste, 2010).

Beauchamp and Thomas (2009) point out that internal factors such as personal beliefs, attitudes and emotions, and external factors such as educational systems, job environment and life experiences shape and reshape "the shifts and changes in a teacher's identity" (p. 184). In addition, Skelton (2012) argues that teacher identity is influenced at three levels: the micro level (personal biographies and life experiences), meso level (occupational contexts and community of practice) and macro level (social contexts). Before moving to the meso and macro levels, teachers "develop a personal theory of teaching and

a stock of familiar pedagogical practices" which are later reshaped by other factors (p. 27). Due to all these factors, the formation of teacher identity is conceived of as an ongoing process in which teachers interpret and reinterpret a complex network of personal, social and life values, practical knowledge and experiences as they become part of their daily lives (Beauchamp & Thomas, 2009; Beijaard et al., 2000; Flores & Day, 2006). It is a dynamic process that goes under a set of shifts, and forms and reforms a variety of teacher identity which is shaped and reshaped by the self and the context (Beauchamp & Thomas, 2009; Flores & Day, 2006).

The formation of teacher identity, as discussed, cannot be separated from or ignored in teacher education programmes. It is a natural transformation where student teachers experience its effects gradually even if there is no direct teaching of it. Drawing on the findings of their longitudinal research from their *Becoming a Teacher* project in England, Malderez et al. (2007, p. 242) conclude that "the development of a teacher identity is a core aspect of the experience of becoming a student teacher" (p. 242). Becoming a teacher, at a later phase, is transformed by teacher identity (Flores & Day, 2006) because learning to become a teacher entails "learning to think like a teacher, learning to know like a teacher, learning to feel like a teacher and learning to act like a teacher" (Feiman-Nemser, 2008, p. 698). If teacher identity is clearly addressed in teacher education, many benefits can be achieved. An awareness of teacher identity will "contribute to teachers' self-efficacy, motivation, commitment and job satisfaction" (Flores & Day, 2006, p. 220). In addition, it will help student teachers to organise their professional lives when they become teachers (Beauchamp & Thomas, 2009). Moreover, it will provide "a framework for teachers to construct their own ideas of 'how to be', 'how to act' and 'how to

understand' their work and their place in society" (Sachs, 2005, p. 15). To achieve these benefits, tasks such as teaching planning skills, self-reflection, personal biography journal, student/peer feedback and reflective practice should be implemented (Flores & Day, 2006; Timoštšuk & Ugaste, 2010). It can be acknowledged that addressing and developing teacher identity in the curricula of teacher education will act as a phase where student teachers start to make sense of their newly formulated initial teacher identity with the knowledge of oneself and knowledge of the other self (being a teacher). Therefore, Kumaravadivelu (2001) argues for a teacher education programme in which "student teachers' values, beliefs, and knowledge [are] an integral part of the learning process" (p. 552). According to him, when their voices and visions are addressed, "the entire process of teacher education becomes reflective and rewarding" (p. 552).

Linking teacher identity with threshold concepts, we cannot overlook the possible relationship between any potential threshold concepts and the development of initial teacher identity in teacher education. Meyer and Land (2003) believe that threshold concepts pave the way for epistemological and ontological change in learners' understanding when studying their disciplines. Along with this transformational learning, learners go through and experience a "shift in [their] identity" (Meyer & Land, 2006, p. xvi). Threshold concepts, if clearly identified and presented in teacher education curricula, can enhance student teachers' experiences in shifting towards the early stages of forming their teacher identity in order to understand their new positions at the micro level (better self-awareness as a person) as well as at the macro level (better self-awareness as a teacher belonging to a community of practice). In the liminal space and with experiencing transformative learning, student teachers will likely

be able to rediscover their selves and retest their beliefs and values about teaching and learning. It is important to note that student teachers have still got a long way to go until they become real teachers and have a teacher identify. They have not yet become a teacher, but they can be helped to see themselves as teachers. Hence, it can be argued that a teacher education programme oriented on threshold concepts and liminal space will give student teachers opportunities to test and retest their beliefs, attitudes and values about teaching in which an initial teacher identity can be developed.

What can be understood from the points discussed above is that student teachers should be given the opportunity to interact positively with the knowledge they bring to teacher education programmes and the subject matter knowledge they are going to acquire in order to create and develop an initial teacher identity. The process of these two interactions will help them experience transformative learning as well as developing an initial teacher identity, which is largely reshaped later by their community of teaching practice when they become members. It will be interesting to look at the literature of threshold concepts in order to find some research that has been conducted to identify threshold concepts in teacher education. The following section presents some investigations into educational concepts identified as threshold concepts.

2.6.2.2 Research on Threshold Concepts in Teacher Education

It is worth noting that the literature about threshold concepts shows a few research studies that have been carried out in the context of ELT teacher education such as Cove et al. (2008), Orsini-Jones (2015), Alnajjar and Altamimi (2016), Moroney et al. (2016) and Orsini-Jones, Conde, Borthwick, Zou, and Ma

(2018). A critical examination of three of these studies will help us understand how threshold concepts have been identified.

An earlier research study on threshold concepts in ELT teacher education was conducted in Scotland by Cove et al. (2008). They explored potential threshold concepts and transformative experiences encountered by beginning teachers. They targeted 24 probationary teachers in ten Local Authorities and ten primary and secondary mentors in six Local Authorities. Their data collection tools were focus groups, an on-line questionnaire and semi-structured interviews. They started their research using two focus group sessions with the 24 beginning teachers. Nine potential threshold concepts were reported after thematic analysis of the focus group transcriptions. After that, the participants were sent an online questionnaire addressing those nine concepts. Finally, semi-structured interviews were conducted with the same participants and ten primary and secondary mentors. Drawing on the findings, Cove et al. (2008) identified ten possible threshold concepts in teacher education including classroom management, lesson planning, learned effectiveness, and social and professional relationships within schools. A critical look at Cove et al.'s research findings causes one to question the criteria the researchers used in identifying their threshold concepts as they were able to propose ten threshold concepts, a seemingly large number, in their small scale research study. Besides, they concluded that some general statements (e.g. social and professional relationships within schools) were threshold concepts when they cannot be considered as concepts in the first place.

A recent research study on threshold concepts in ELT teacher education was carried out in Ireland by Moroney et al. (2016). The participants were eight in-career language teachers and three student language teachers. The

researchers used interviews and reflective journals. Their research procedure started with interviewing eight in-career language teachers about educational concepts that are essential for good language teaching. After that, the researchers asked three pre-service teachers to email their reflective journals every 2-3 weeks over seven months focusing on challenges they were facing in their teacher training programme. At the end of their programme, semi-structured interviews were conducted with each student. Based on their findings, Moroney et al. suggest that language use, learner autonomy and learner-centered teaching could be identified as threshold concepts in teacher education. Though the research study was well designed, the small number of participants (only 11 in total) calls into question the likelihood that they are evidence of threshold concepts in teacher education. Therefore, the results cannot be generalised.

A more recent research project aimed to investigate ELT student teachers' beliefs with particular reference to learner autonomy when implementing a blended Massive Open Online Course (MOOC) was conducted by Orsini-Jones et al. (2018). The project, entitled B-MELTT (blended MOOC for English Language Teacher Training), involved a mix of 154 ELT experienced teachers and student teachers studying at five higher education institutions in three countries (the UK, China and Netherland). The researchers implemented a grounded mixed-method approach which consisted of pre-MOOC and post-MOOC online survey, group and individual interviews, transcripts of the in-class assessment and post-project reflective journals. One of the main findings of the research project was that the concept of learner autonomy is troublesome because "it is alien in terms of both language and knowledge (epistemological dimension) and the identity of learner (ontological dimension)" (p. 13). The

researchers concluded that understanding learner autonomy leads to transformative learning; therefore, it is a threshold concept. It is important to note that in this study learner autonomy was identified by collecting data across a range of contexts and using different data collection instruments. The triangulated data obtained from the 154 participants provided significant findings which support similar results found in previous studies done by Orsini-Jones (2015) and Alnajjar and Altamimi (2016).

Some educational concepts have been identified as threshold concepts in teacher education so, the most important question is: how can researchers, course designers, educators and instructors, implement a curriculum which is oriented around threshold concepts? As discussed in the previous sections, threshold concepts are not a group of concepts that are delivered to learners. In addition, taking into account the characteristics of threshold concepts which include troublesome knowledge (the liminality, the modes of variation) and the transformational learning, the task of designing a threshold concepts curriculum is not easy as the following section will reveal.

2.7 Threshold Concepts in the Curricula of Higher Education

In a neoliberal world that is based on industry and free markets and accordingly values university graduates equipped with professional knowledge, the need for tertiary curricula that prepare students to be professionally knowledgeable in their disciplines has become a necessity. Therefore, Land and Meyer (2010) believe that threshold concepts are a powerful conceptual framework for designing effective and meaningful curricula for tertiary disciplines. Furthermore, they describe threshold concepts within a discipline as the ‘jewels in the curriculum’ as “[they] can be used to define potentially powerful transformative

points in the students' learning experiences" (p. 75). They argue that a curriculum based on threshold concepts could make teachers aware of the areas where troublesome knowledge and liminal space cause difficulty and create conceptual obstacles to students' learning (Land & Meyer, 2010). Arguably, liminal space is an area that many teachers do not anticipate and overlook when designing and delivering their curricula. Curricula need to clearly address learning difficulties which are caused by troublesome knowledge, and students should experience a learning environment that supports their understanding of difficult concepts and their progress in their studies (Cousin, 2008). Therefore, curricula based on threshold concepts could create a "supportive liminal environment' for students who are highly likely to face difficulties when they undergo 'complicated learner transitions" (Cousin, 2008, p. 264). Theoretically, one of the strengths of a curriculum framework based on threshold concepts is that it addresses the liminal space that many learners are highly likely to experience in their study as learning is not a linear approach to acquiring knowledge. As discussed in the previous sections, acquiring knowledge is an interactive process through which learners may get 'stuck' in a liminal space before understanding concepts. In liminality, learners should not be left alone but rather their liminal space should be addressed in any given curriculum. However, before evaluating the possibility of designing a curriculum based on threshold concepts, first the definition of curriculum in this educational context will be defined.

2.7.1 Definition and Issues related to Curriculum

In order to organise and deliver education, we must contextualise the concept of curriculum in a framework that can be theoretically and practically taught,

assessed and evaluated at later stages. Basically, curriculum is the framework in which education with all its philosophical, political, economic, social and cultural sense is organised (Apple, 1993; Ball, 1993; Bernstein, 1971; Young, 1971).Therefore, the term curriculum is too big and cannot have one definition that could suit all the different contexts (Finney, 2002). However, within the context of education, curriculum could be defined as the epistemological and ontological framework of an educational programme that constitutes the basis of addressing human values, setting the educational goals, aims and objectives, selecting knowledge to be taught, designing instructional materials, implementing teaching-learning approaches, assessing students' performance, and measuring the effectiveness of teaching and learning outcomes (Finney, 2002; Hirst, 1969; Richards, 2001). In other words, it is "the *why*, *how*, *how well* together with the *what* of teaching-learning process" that constitute curriculum (Finney, 2002, p. 70). This wider sense of defining curriculum provides "the overall rationale for the educational programme of an institution" (Kelly, quoted in Finney (2002, p. 70). Yet, curriculum, in its narrowest sense, is also used as a synonym for the term syllabus when we talk about the selection and ordering of the subject matter and teaching materials to be taught (Finney, 2002; Richards, 2001). However, a syllabus is a small part of any curriculum of an educational programme as curriculum deals with evaluating the effectiveness of an educational programme and it considers much more contextual factors (Richards, 2001).

As discussed above, it is clear that the process of planning a curriculum is very complex as it involves the consideration of many factors such political, economic and social aspects (Apple, 1993; Bernstein, 1971; Collins, 1971; Richards, 2001; Young, 1971). What makes it even more complicated is the

process of selecting and organising knowledge in an educational system that addresses the dynamics of changing values in the global context (Bernstein, 1971; Young, 1971). According to Bernstein (1971, p. 203), “Curriculum defines what counts as valid knowledge”, and he suggests what he calls an 'educational knowledge code': a set of underlying principles working as a tool for selecting and organising knowledge, through which curriculum is regularly shaped. On the other hand, Young (1971) critically raises the question: “How far and by what criteria were different knowledge areas stratified?” (p. 35). It can be argued that though designing a curriculum cannot be decontextualized from the national as well as the global demands that shape the educational policies at higher education, it is still important to have a curriculum with well-selected, organised knowledge, clearly defined objectives and effective assessment. Therefore, in order to organise and deliver knowledge effectively in higher education, knowledge should be contextualised in a framework that can be theoretically and practically taught, assessed and evaluated.

Considering the views discussed above, it is still unclear how a curriculum based on the conceptual framework of threshold concepts can be designed, delivered and evaluated. Some might even argue about how knowledge based on threshold concepts should be selected, organised and assessed at higher education. In my opinion, it appears as though there is still much work that needs to be done if advocates of threshold concepts plan to design tertiary curricula based on the framework of threshold concepts. They should outline general structures of underlining principles, graded stratification of discipline subject matter, appropriate teaching methods, relevant assessment tools and well-trained university teachers who are aware of and believe in the transformative nature of threshold concepts in tertiary disciplines. Without a

clear picture of how threshold concepts of a discipline are organised, presented and assessed, it will be too difficult and confusing to design tertiary curricula based on threshold concepts. Until the literature on threshold concepts explores the possibility of designing curricula based on threshold concepts and provides positive results, teaching threshold concepts as part of the syllabi of disciplines in our current tertiary curricula seems to be more practical and more effective rather than hastily created curricula based on threshold concepts without thinking of the consequences that may arise.

2.8 Conclusion

This chapter discussed the notion and development of threshold concepts with more focus on the troublesome and transformative characteristics. It presented some arguments which critiqued the true nature of threshold concepts especially on whether threshold concepts are mainly mental representations or if abilities and skills should be added. Some research studies on identifying threshold concepts were discussed and it was found that there is no unified systematic approach to identify threshold concepts. As threshold concepts cannot be discussed in an isolated manner, other related concepts were discussed such as the conception of knowledge, learning orientations and teacher identity.

Motivated and driven by exploring how initial teacher identity is initially developed in student teachers in ELT teacher education programme, it was believed that the analytical framework of threshold concepts used in this research study could provide some insightful findings as it deals with troublesome knowledge and transformational learning. The following chapter details how this research study was designed and implemented.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter details the methodology and design of the study. It also discusses the reasons why the data collection tools, namely a questionnaire and interview, were selected and how they were implemented. In addition, the reasons why the pilot study was not effective are presented and a discussion of ethical issues is included. It also provides a rationale for methodological decisions taken as well as an explanation of challenges encountered and the ways in which these were addressed. Finally, the processes involved in the analysis of the data are outlined.

3.2 Research Methodology

This research study implemented a mixed methods approach that consisted of two data collection tools: a questionnaire and interview. Though using mixed methods research to identify threshold concepts is not common practice, it was believed that targeting many participants using both a questionnaire and interview would generate more comprehensive data which could provide a better understanding of social phenomena (Biesta, 2012; White et al., 2016). Also, the purpose of eliciting quantitative data by using a close-ended and open-ended questionnaire was to minimise the researcher's influence on participants' responses compared to the interpretive analysis of interviews (Biesta, 2012; Cousin, 2009; Silverman, 2001; White et al., 2016) . A third reason in support of the rationale to use mixed methods research was to obtain more valid findings from using different methods which "enhance the strength and validity of research findings" (Biesta, 2012, p. 147). As the implementation of using a mixed methods approach would serve the purpose of identifying threshold

concepts in teacher education based on a large number of participants, “there is no reason why qualitative researchers should not, when appropriate, use quantitative measures” (Silverman, 2001, p. 37). For the purpose of generating more substantially reliable findings, a compare and contrast analysis was used for analysing data obtained from 212 participants in the questionnaire sessions and 20 participants in the interview sessions at two Omani colleges. This triangulation of data collection and analysis would strengthen the validation of the findings (Silverman, 2001).

The analytical framework for the research structure was based on the characteristics of threshold concepts and how they can develop initial teacher identity in ELT Omani student teachers. The questionnaire and interview instruments focussed on the transformative, troublesome, integrative, irreversible and discursive characteristics, which were considered to be measurable; therefore, easy to analyse, discuss and report. The characteristic of being bounded was not addressed in the questionnaire or interview as it was thought to be too difficult for participants to answer since it goes beyond the learners’ capacity and can be only determined by experts (e.g. curriculum designers and course instructors). In addition, the feature of a threshold concept being reconstitutive was not addressed as it was thought to be too complex for students to talk about.

3.3 Design of Study

In order to contextualise the implementation of the research data collection methods, it is important to think of and decide on a practical, effective “sequence of data collection” before designing the data collecting instruments (Gorard, 2013, p. 3). According to Creswell (2003), there are four phases of research

sequence when selecting a mixed methods approach which are implementation/timing, priority/weighting, integration/mixing and theoretical perspective/theorising. Therefore, the sequential framework for the research design started with the quantitative data collection tool (questionnaire) followed by the qualitative data collection instrument (interview). It aimed first to gather data on educational concepts from as many participants as possible by using the questionnaire in order to compare and contrast the quantitative research findings before conducting interviews to investigate any themes emerging from the qualitative data analysis based on the findings of the quantitative part. The research study started with a collective group of responses on potential threshold concepts in teacher education and ended with individual experiences on those potential threshold concepts collected from the quantitative findings.

The research study started with the distribution of questionnaire to Y1 and Y4 student teachers at two different Omani colleges (ASU and CRU) and the data were analysed by using SPSS. After that, a compare and contrast analysis was conducted on the Y1 and Y4 data collected at ASU and CRU separately and a finalised list of potential threshold concepts was generated from each college. Then the two finalised lists obtained from ASU and CRU were comparatively analysed in order to establish a final list of potential threshold concepts in ELT teacher education. After that, the list was sent to instructors at both ASU and CRU asking their opinion on whether or not they considered the listed educational concepts very important to learn and understand by student teachers. The next step was the semi-structured interview sessions, where only Y4 student teachers at the same colleges were interviewed. Finally, the interview sessions were transcribed and thematically analysed using NVivo,

based on the findings of the questionnaire analysis (the finalised list of potential threshold concepts). Table 3.1 illustrates the design of this research study.

Table 3.1 Design of the research study

Steps	Procedures
1	Questionnaire was distributed to Y1 and Y4 student teachers at ASU
2	Questionnaire was distributed to Y1 and Y4 student teachers at CRU
3	An initial ASU Y1 list of potential threshold concepts was generated
4	An initial ASU Y4 list of potential threshold concepts was generated
5	A finalised ASU list of potential threshold concepts was generated by comparing Y1 and Y4 initial lists
6	A initial CRU Y1 list of potential threshold concepts was generated
7	A initial CRU Y4 list of potential threshold concepts was generated
8	A finalised CRU list of potential threshold concepts was generated by comparing Y1 and Y4 initial lists
9	A final list of potential threshold concepts was generated by comparing concepts on both ASU and CRU finalised lists
10	ASU and CRU Instructors were contacted via email for opinion on the potential threshold concepts generated on the final list
11	Interviews were conducted with Y4 student teachers at ASU
12	Interviews were conducted with Y4 students teachers at CRU
13	Data obtained from ASU and CRU interviews were transcribed and thematically analysed based on the concepts identified in the questionnaire analysis (the final list)

3.4 Research Methods

The aim of this research study was to identify potential threshold concepts in teacher education from student teachers' actual experiences and conceptions of knowledge. Therefore, a questionnaire and interview were considered as the most relevant data collection tools to help collect quantitative and qualitative data relevant to the research questions. The selection of research methods was based on the threshold concept framework proposed by White et al. (2016) and the transactional curriculum inquiry proposed by Cousin (2009). White et al. designed their framework by using mixed methods research in which survey was implemented for measuring students' level of comfort. As this research study aimed to measure the level of student teachers' awareness of the characteristics of threshold concepts in general, it was thought that using a questionnaire would be very effective to generate collective data on students' awareness before asking them about troublesome and transformative concepts they had experienced. As for Cousin, she developed her research framework for the purpose of carrying out a systematic way to explore learning difficulty and transformational learning; accordingly, to identify threshold concepts in disciplines. One of her data collection tools was student interviews, which was implemented in this research study. Both the questionnaire and interview sessions aimed to generate a final list of potential threshold concepts in ELT teacher education with minimal researcher's influence.

3.4.1 Design of Questionnaire

The design of the questionnaire took into consideration many useful points proposed in the literature. Some of the most important cautions are that questionnaires should not include any items that might be considered biased or

offensive, while leading questions are to be avoided (Blaxter, Hughes, & Tight, 2000; Cohen, Manion, & Morrison, 2000). The questionnaire was designed to be student-friendly because a reasonable length of questionnaire gives a good impression from the first sight and encourages participants to read carefully and provide real answers (Blaxter et al., 2000; Tymms, 2012). In addition, the literature highlights the importance of informing participants of the nature of the research (Blaxter et al., 2000; Cohen et al., 2000). Therefore, the questionnaire in this study included an introduction page stating the name of researcher, the degree programme, the purpose of the study and the importance of participants' responses to the research. All this aimed to create a friendly, encouraging context and give participants a rough idea about the content of the questionnaire (Cohen et al., 2000). In addition, the Likert-scale items in the questionnaire included a neutral point which gave participants the right not to give an opinion if they wanted, which is one of the research rights that should be granted to participants (Cohen et al., 2000). The questionnaire also asked participants not to write their names, and made it clear that the responses would be confidential. This is a very important ethical point which should be taken into account in order to protect participants from any potential threat or breach of privacy (Cohen et al., 2000).

Taking all these cautions into consideration, the questionnaire was designed and divided into four parts plus the introduction page that provided some information about the purpose of this research study. The first part gave some definitions and examples of the meaning of *knowledge* and *concept* which were key words in the study. The second part asked participants for some general information such as gender and name of college. As for the third part, it consisted of 11 statements presented on a seven-point Likert scale from 1

strongly disagree to 7 strongly agree where 5 represented (no opinion) in order to measure to what extent participants were aware of the characteristics of threshold concepts in general. The fourth part included three open-ended questions with short answers that focused on troublesome knowledge and transformative concepts. Table 3.2 outlines the parts of the questionnaire (See Appendix C for more details).

Table 3.2 An outline of the questionnaire design

Part	**Content**	**Purpose**
Introduction Page	Description of the purpose of the research	To give a context to participants
Part 1	Definitions of the two key words knowledge and concept	To activate participants' prior knowledge
Part 2	Questions for general information (gender, age, name of college, year of study,	To assist the researcher in data collection
Part 3	7-point Likert scale with 11 statements on the characteristics of threshold concepts in general	To measure how extent participants are aware of characteristics of threshold concepts in general
Part 4	Three open-ended questions on troublesome knowledge and transformative concepts	To generate data on potential threshold concepts in ELT teacher education

It is important to note that the statements in part 3 of the questionnaire were designed to represent the following characteristics of threshold concepts: troublesome, transformative, irreversible, integrative and discursive. The characteristics of bounded and reconstitutive were excluded as they were

deemed to be too complex for students to understand and provide accurate opinions. Table 3.3 shows the characteristics that the statements represented.

Table 3.3 Statement codes in the questionnaire

	Statements	**Code**	**Characteristic**
*1-Trb+	I think most of the concepts I learned in teacher education programme were easy to understand.	Trb	troublesome
2 Trb+	I have faced a lot of problems with understanding some difficult concepts.	Trb	troublesome
3 Trb+	I got 'stuck' when I was unable to understand some difficult concepts.	Trb	troublesome
4 Trb	Some difficult concepts have made me study harder.	Trb	troublesome
*5-Trf+	I learned many educational concepts, but I have not experienced any change in the way I think.	Trf	Transformative
6 Trf+	After understanding some concepts, I felt I was like a teacher.	Trf	Transformative
7 Trf	Some concepts have shown me that teaching needs a higher level of thinking.	Trf	Transformative
8 Trf	Some concepts have changed the way in which I see the world.	Trf	Transformative
*9 Irr	I still remember the difficult concepts which I have already understood.	Irr	Irreversible
*10 Int	Some concepts have helped me understand other concepts that were difficult in the beginning.	Int	Integrative
*11 Disc	After understanding some concepts, I became able to clearly express my ideas in class discussion.	Disc	Discursive

3.4.2 Design of Interview

The design of the semi-structured interview addressed many points advocated in the literature of designing interviews for qualitative research. A semi-structured interview with open-ended questions was implemented as it gives participants more freedom to express their ideas, feelings, attitudes and perspectives within a framework that guides the flow of interaction (Bell, 2005; Burns, 2000; Hobson & Townsend, 2010). Such a guided framework helps interviewees to focus on the salient points that the researcher wants to explore (Burns, 2000). The interviews were recorded and transcribed so that the interviewer would not miss important points when conducting a thematic analysis (Bell, 2005; Burns, 2000; Hobson & Townsend, 2010). As interviewing people is a very sensitive process, especially when it is tape-recorded, ethical issues should be addressed clearly in order to protect participants from any consequences that might affect their life (Burns, 2000; Creswell, 2008; Hobson & Townsend, 2010; Kvale, 1996). Therefore, the interviewees were asked to give their permission to tape-record their voices and to sign consent forms after they were briefed that recordings would be kept in a safe place and would be used only for the purpose of the research study. An interview data protocol form was also designed (see Appendix D) in order to guide the interviewer and record any relevant information or non-verbal communication that could reveal interviewee's anxiety or excitement such as body language or hand movements as suggested by Creswell (2008). The researcher also kept eye contact and used nodding with encouraging words throughout the interview sessions in order to keep the flow of interview, which is considered important as the interviewer should possess a high level of communication skills and the ability to be a good listener (Kvale, 1996). A lack of attention or sign of an inconsiderate reaction to

what the interviewee is saying may demotivate the participant from expressing more thoughts and opinions (Bell, 2005; Kvale, 1996). Due to the fact that interviews are not conversations, it is important for interviewers to carefully prepare the logistics of the interview settings and anticipate any potential problems beforehand (Mears, 2012). For instance, a construction building opposite the interview room will probably cause much noise. Therefore, with the help of research assistants at both colleges, an interview room was selected away from corridors to classes and cafeterias where the level of noise would be expected to be high. Addressing the interviewees' right to know from the beginning the subject and types of questions and whether they want to continue or not (Bell, 2005), the interview questions were given to them before conducting the interview sessions.

When designing the interview, the seven-step framework for conducting a successful interview as suggested by Kvale (1996, p. 88) was taken into account:

> 1. Thematizing: the interview should have a theme and purpose to investigate.
> 2. Designing: plan for the type of interview.
> 3. Interviewing: Carry out the interview with clear instructions.
> 4. Transcribing: Tape-record and transcribe the interview.
> 5. Analysing: Choose a method of classifying data.
> 6. Verifying: Make sure of the reliability and validity of the data obtained.
> 7. Reporting: Present the findings in a systematic way.
>
> (Kvale, 1996, p. 88)

Other points that were taken into account in order to be a skilled interviewer and conduct an effective interview as suggested by Kvale (1996) and Creswell (2008) are shown in Table 3.4 below.

Table 3.4 Tips for skilled interviewer and effective interview

Points to consider for a skilled interviewer (Kvale, 1996)	**Points to consider for an effective interview (Creswell, 2008)**
1. Know the subject matter. 2. Structure the interview well. 3. Be clear in the terminology. 4. Allow participants to take their time and answer on their own way. 5. Be alert to significant aspects. 6. Keep to the point and the matter in hand.	1. Identify the interviewee. 2. Determine the type of interview. 3. Audiotape the interview. 4. Locate a quiet, suitable place for the interview. 5. Have a plan, but be flexible 6. Use probes to obtain additional information.

Semi-structured interviews were used in this research study in order to give a direction to both researcher and interviewees to focus on “the crucial issues of the study” (Burns, 2000, p. 424). On the other hand, one major drawback of using semi-structured interviews that researchers should be aware of is interviewer's and interviewee's bias. Cohen, Manion, and Morrison (2007) explain that “interviewers and interviewees alike bring their own, often unconscious, experiential and biographical baggage with into the interview situation” (p. 150). They warn of the lack of validity and reliability of data obtained. As the research design aimed to minimise researcher’s influence or bias as well as participants’ bias in the interview sessions, the interviews were conducted at two different colleges and the interviewees’ accounts were thematically analysed and compared.

Taking all these points into account, a semi-structured interview data protocol form was designed for Y4 ELT student teachers. Thirteen interview questions were designed addressing the troublesome knowledge,

transformative concepts as well as awareness of initial teacher identity. The interviews were recorded and transcribed for data analysis using NVivo. Table 3.5 shows the list of questions.

Table 3.5 Questions of the interview

	Interview Questions	**Themes**
1	My first question: Why do you want to be a teacher?	Initial teacher identity
2	In your opinion, what are the main characteristics of a 'good' teacher?	Initial teacher identity
3	What knowledge do you think you need to acquire in order to become a teacher?	Initial teacher identity
4	Now can you tell me a little bit about the content of your course? I am particularly interested in the key educational concepts and ideas you have learned.	Concepts in general
5	Amongst these concepts, have there been any specific ones which have been particularly difficult, that you really struggled with and found extremely hard to understand? Which ones were they?	Troublesome knowledge
6	The difficult concepts you've just mentioned, why did you find them the most difficult ones? I mean why were they too difficult?	Troublesome knowledge
7	What strategies did you use to overcome these difficulties and understand these concepts?	Troublesome knowledge
8	Are there still any educational concepts you still find them too difficult to understand? What are they?	Troublesome knowledge
9	How will you try to overcome these difficulties and understand these concepts?	Troublesome knowledge
10	Amongst all the educational concepts you have mentioned in this interview, have there been any specific ones that have fundamentally changed the way in which you see the world and yourself? Which ones were they?	Transformative concepts
11	Could you give me some examples of how these concepts have	Transformative

	helped you see the world and yourself in a different way?	concepts
12	Do you feel that the educational concepts which had great influence on you have helped you acquire some qualities of being a teacher? Could you give me some examples?	Transformative knowledge + Initial teacher identity
13	*Q13. As being a teacher, what makes you different from other people? (* I only ask Q13 when the student makes it clear he or she feels like a teacher in their response to Q12.)	Initial teacher identity

While transcribing the interviews, non-verbal communication and contextual cues were coded because they give more contextual data to the verbal communication and reveal important information that words cannot show (Cohen et al., 2007). Therefore, a system of coded symbols was used during the process of transcribing the data as Table 3.6 illustrates.

Table 3.6 Transcribing coded symbols

Coded Symbols	**Represent**	**Examples**
...	short pause less than 2 second	Interviewee: I feel like a teacher because I have … pedagogical knowledge.
(…)	Unnecessary sentences or phrases deleted	Researcher: (…). Let me ask you about some examples (etc.).
er	represents sounds used before talking	Interviewee: The main er educational concept that I learned (etc.).
(pause)	Represents pause longer than 2 seconds	Interviewee: A difficult concept I faced … (4-second pause)
(word-ing)	represents non-verbal communication	Interviewee: I think this is a good point (smiling)
word = word	Grammar self-correction or new idea is presented in the same sentence	Interviewee: What I'm trying to say is that the concept = the teacher showed us (etc.).

word - word	Vocabulary self-correction	Interviewee: I will help them to practice their role outclass-outside classrooms.
sentence -	The other speaker interrupts and takes the floor	Interviewee: The concept was difficult - Researcher: - Why was it difficult?
+words+	Interviewee and interviewer speak at the same time	Interviewee: This helped me to improve myself … +because it+ showed me (etc.). Researcher: +How did it help+?
word	word said in Arabic	Interviewee: This influenced on me *yaani* very much. *yaani* = an Arabic expression used to emphasise meaning. It literally means (it means)
***	Used to indicate a word said in the interview but deleted in the transcription to protect confidentiality	Interviewee: I heard this word from my instructor Dr ****.

3.5 Procedure of Data Collection

The procedure of data collection went through different stages. Firstly, a request letter for conducting an Ed.D research study was sent to ASU and CRU explaining the purpose of the research, the target participants and the data collection tools. Both colleges approved the research visit and provided an assistant to follow up the arrangements. Before the visits, a pilot study had been conducted with four ELT Y4 student teachers in a small local university located in the researcher's city in the south of Oman to see how well the questionnaire was designed. Some changes were made to the questionnaire based on the participants' feedback. A total of 15 minutes were recorded for completing the questionnaire. As no pilot was conducted with Y1 student teachers, the 15-minute time slot requested for administering the actual questionnaire at the two colleges turned out to be not enough, and this affected the data collection in the

first visit. As the first class visit to an ASU Y1 class took more than 25 minutes and the instructor showed resentment, the written informed consent form to be given to the participants to sign was skipped to save time in other classes at both colleges. Though the ethical rights of research participation were verbally communicated to the participants, it turned out that a written informed consent form was essential in order to secure participants' rights and validate the research study (see section 3.6). Because of that, all the questionnaire forms obtained from Y1 and Y4 student teachers at ASU and CRU were destroyed. Consequently, the procedure of collecting data went through two phases due to the ethical research issue that occurred during the first phase in May 2018. Another phase of distributing the questionnaire took place at the end of November 2018, where a 30-minute questionnaire session was requested and a written consent form was handed out to every participant. The duration was enough for participants to sign the written informed consent forms and complete the forms of the questionnaire.

In the second phase of distributing the questionnaire, a better arrangement was administered with the assistant at ASU and a schedule for class visits to Y1 and Y4 classes was made. Participants were given the written informed consent forms to sign (See Appendix B) after a brief explanation of their rights as volunteers and their right not to participate or even to withdraw from the research study. The participants were given 5 minutes to read the consent forms. After that, the researcher asked a volunteer to collect and shuffle the signed informed consent forms once he had removed himself from the class for the sake of confidentiality. After the written informed consent forms were collected, the questionnaire forms were distributed and the researcher returned to explain the parts of the questionnaire. Participants were asked to leave the

completed questionnaire forms on their desks, and another volunteer was requested to collect and shuffle the questionnaires before handing them in to the researcher. The same procedure was carried out at CRU. It is worth mentioning that a few students refused to take part in the study at both colleges and they were asked to leave the class.

As for the interview sessions with Y4 student teachers at one of the colleges in May 2018, the arrangement was not well prepared and administered. The assistant had been ill for a week and she did not provide the researcher with a schedule of volunteers and interview times. As a result, the researcher had to make an announcement for interview volunteers at the end of the Y4 questionnaire sessions. Seven student teachers showed interest in participating. In the individual interview sessions, the interviewees were given the questions to look at and decide whether they would like to continue or not. When they decided to continue, they were briefed on research ethical rights and were requested to sign the written informed consent forms. The interview sessions were completed without any issues to report. On the other hand, the interview sessions with the Y4 students at the other college were better arranged and administered. The assistant emailed the researcher a list of seven volunteers with the interview times. The participants were given the interview questions, briefed on research ethical rights and given the written informed consent forms to sign. The sessions were conducted without any problems. In all the interview sessions at ASU and CRU, all the interviewees agreed to audio taping of the interviews. Due to the low number of participants and short duration of interviews (ranging from 15-23 minutes), 14 interviews were found insufficient for providing substantial qualitative data. Therefore, another round of interview sessions was conducted in November 2018 at the same colleges. The same

procedures were administered and three volunteers from each college participated, which raised the number of interviews to 20.

3.6 Research Ethical Code of Conduct

This research study was governed by the ethical code of conduct of Durham University where research ethics are seen as a fundamental part of any research (Braun & Clarke, 2013; Cohen et al., 2007; Miles & Huberman, 1994). Taking into consideration research ethics before designing and conducting research is an essential step that will prevent researchers from facing serious issues related to research ethics. As pointed out by Cohen et al. (2007), “One has to consider how the research purposes, contents, methods, reporting and outcomes abide by ethical principles and practices” (p. 51). Many principles and guidelines have been proposed to ensure that research ethics are acknowledged in research papers. Braun and Clarke (2013) refer to the British Psychology Society’s (BPS) research code of conduct which emphasises the aspects of respect, competence, responsibility and integrity. Similar to BSB’s research protocol, Savin-Baden and Major (2013) outline four guidelines which ethical research should address, which are: 1) excellent treatment of individuals, 2) efficacy of design, 3) transparency of process and 4) plausibility of research products.

An essential part in research ethics based on respect and responsibility is to gain informed consent from participants so they agree voluntarily to take part in the research study. A clearly stated informed consent form is essential to give participants their right based on their free will and self-determination either to participate in or withdraw from the study (Cohen et al., 2007), to build a trusted relationship between the researcher and participants (Miles & Huberman, 1994)

and to ensure the safety of participants from any harm (Braun & Clarke, 2013; Savin-Baden & Major, 2013). In research, participants have the right to know what the purpose of research study is before they decide whether to participate or not. Above all, they have the right to evaluate the level of potential risks they may face if they agree to participate. Therefore, as it is considered as an "implicit contractual relationship between the researcher and the researched" (Cohen et al., 2007, p. 53), any informed consent form should include information about researcher's background, the purpose of the study, the participant's right to withdraw at any time and any potential risks. Due to the participants' right to participate or refuse to participate of their free will and self-determination, this research study gained their informed consent on signed forms before distributing the questionnaire and conducting the interview sessions.

This research study addressed the importance of taking research ethics into account when carrying out research as participants have the right to be protected from any consequences or harm that may occur as a result of research findings (Braun & Clarke, 2013; Cohen et al., 2007; Cousin, 2009; Miles & Huberman, 1994; Savin-Baden & Major, 2013). As pointed out by Cousin (2009), "The research imperative 'to do no harm' is a central one for ethical approval" (p. 25). Harm in research ethics is not only pertinent to the physical nature, but it can also be psychological, social and economic (Miles & Huberman, 1994; Savin-Baden & Major, 2013). Physical harm is when participants are exposed to physical pain or injury, whereas psychological harm refers to depression, guilt, embarrassment and loss of self-esteem. As for social harm, it is the threats to one's identity and position especially when confidentiality is breached and participants become known to others, whereas

economic harm is referred to as the state where participants lose opportunities of gaining money, promotion or success because of their participation in research. Avoiding all these types of harm, Savin-Baden and Major (2013) emphasise the importance of guaranteeing 'minimal risk' to participants, which means "the risk associated with the study is similar to that typically encountered in daily life or during the performance of routine physical or psychological examinations or tests" (p. 323). As the nature of this research study had minimal risk physically and economically, much consideration was put into having minimal risk regarding the psychological and social aspects. Firstly, interviewees' grammatical mistakes were corrected when excerpts of their interviews were used in the analysis of qualitative data in order to avoid any loss of self-esteem those student teachers of English language may get if they read the research paper (all of them will have been recruited as full-time teachers when this research paper is published). Secondly, pseudonyms of participants' names and the institutions were presented in the research study as recommended by Braun and Clarke (2013) for keeping the social risk to a minimally low level.

This research study seriously addressed the protection of participants' anonymity. As protecting the identities of participants plays a vital role in research ethics, it is protected through increasing the level of anonymity or confidentiality (Braun & Clarke, 2013; Cohen et al., 2007; Miles & Huberman, 1994; Savin-Baden & Major, 2013). It is important to be aware that research method tools (questionnaire and interview protocol forms) or data analyses should not have elements that may reveal the identities of participants (Braun & Clarke, 2013; Miles & Huberman, 1994). For instance, Miles and Huberman (1994) give an example of avoiding using the pronoun 'she' in a study of 111

high schools in a city where there was only one female principal, which meant using the pronoun ‘she’ in their data analysis would identify the principal. Therefore, they had to change the principal’s gender when they presented the data in order to keep her anonymous. Researchers, especially qualitative researchers, should be aware of how identifiable their data are (Braun & Clarke, 2013; Cohen et al., 2007; Miles & Huberman, 1994). That is why the written informed consent forms used in this research study were not attached to the questionnaire or interview protocol forms. Instead, a random volunteer was asked to distribute the written informed consent forms to the participants so they could sign in the absence of the researcher who had walked out of the classrooms. Once the forms were gathered, the researcher re-entered the classrooms and asked a random volunteer to shuffle the forms so there was no way to identify which participant had signed which form. In addition, the questionnaire in this research study did not ask for any personal information that may identify the participants. As for the interview sessions, the researcher shuffled the signed written informed consent forms, so it would be impossible even for the researcher to identify which consent form matched with which interview protocol form, especially the interviewees were a mixture of male and female student teachers. For only the purpose of counting and keeping track of the data, all the questionnaire and written consent forms were given sequence numbers.

Not only did the research study acknowledge that research ethics are not only for the protection of participants’ privacy and safety in terms of respect and responsibility, but it also addressed the aspects of competence and integrity (Braun & Clarke, 2013; Miles & Huberman, 1994; Savin-Baden & Major, 2013). An official request to get approval for conducting research was sent to the

research department at both colleges which granted the approval and assigned a person for assistance. Though the research study focused on troublesome knowledge as experienced by student teachers, the questions in the questionnaire and interview were carefully designed not to prompt participants to say negative words about their instructors or colleges. In addition, the study took into consideration the aspect of honesty and accuracy when presenting the data collected from participants. As discriminatory research should be avoided (Braun & Clarke, 2013), this research study targeted both male and female student teachers. Having both voices acknowledged for the identification of threshold concepts in teacher education, the study cannot be described discriminatory; therefore, another aspect of research ethics in terms of competence was fulfilled.

3.7 Critical Reflection on Access, Data Collection Process and Ethical Issues

Designing and carrying out this research study was not an easy task due to the fact that it faced a number of challenges. First of all, the coordination of the data collection sessions was not easy to administer due to the long distance between the two academic institutions that are located in the north of Oman and my place of residence which is located in the south. I had to fly more than 1000km three times. Each time, I stayed at least for three days to arrange my research visit at each college. I also had to cancel one visit due to illness, even though I was on campus.

At each college, a person was assigned to assist and arrange my research visits. At one college, the process of coordinating schedules, arranging class visits and collecting data was well managed, whereas the research assistant at

the other college had a health problem and could not come to the college during my visit. This made that visit very difficult, and on arrival I had to start all over again to arrange class visits in order to administer the questionnaire as well as recruit volunteers for the interviews.

As reported in the procedure of data collection procedure (see section 3.5), the pilot study was not well-managed and administered; therefore, it gave inaccurate information about the time needed for completing the questionnaire (15 minutes). Because of that, I asked for 15 minutes when I approached the instructors for class visits. However, during the actual questionnaire sessions, more than 25 minutes was needed for each session. As the instructor in the first session showed dissatisfaction for taking more than 15 minutes as requested, I made a wrong decision in the other sessions by only having verbal, not written informed consent. Consequently, this was not ethically accepted, so all the data obtained from the first visit was destroyed. A second visit was made where 30 minutes was requested for the questionnaire sessions, which was granted. Reflecting on what went wrong, it turned out that I had forgotten to include time for administering the written informed consent in the pilot study. I focused only on the completion of the questionnaire in order to get feedback about the questions as to whether they were easy or difficult to understand. In addition, the four Y4 volunteers for the pilot study were among the top students in their class; therefore, their high level helped them finish the questionnaire in 15 minutes as they did not have to spend more time thinking of what to answer. Consequently, my research progress was greatly affected by this ethical issue; an issue that could have been avoided simply by conducting a proper pilot study targeting Y1 not Y4 students. Indeed, piloting the questionnaire in a very

effective way informs researchers of the 'practicability' of the questionnaire (Cohen et al., 2007).

Having discussed the research methodology, research methods and research ethics, the following sections will present a detailed description of how the quantitative and qualitative data were analysed.

3.8 Quantitative Data Analysis: The Questionnaire

A questionnaire was distributed to a total of 212 Y1 and Y4 student teachers at two academic institutions in Oman asking questions about their level of awareness regarding threshold concepts in general and about their knowledge of troublesome and transformative educational concepts they had experienced in their ELT teacher education programmes (BA degree). As table 3.7 shows, the total percentage of the gender ratio of the 110 Y1 male to female participants at both colleges was almost the same (51% females and 49% males), whereas the percentage of female participants in Y4 comprised 70% out of the 102 Y4 participants at both colleges. College-wise, we can see that the number of female participants was more than the male participants in all the study groups except in Y1 at CRU where male students represented 69% of the total of 59 Y1 participants at CRU. At ASU, the majority of the 51 Y1 and 53 Y4 student teachers were females representing 75% of participants in each study group. On the other hand, 30% of female participants in Y1 at CRU participated, whereas the 31 female participants in Y4 represented 63% out of the total of 49 Y4 participants at CRU. In total, 85 male and 127 female student teachers participated in the study.

Table 3.7 Information on Y1 and Y4 participants at ASU and CRU

		Year 1			Year 4+		
		Gender			Gender		
		Male	**Female**	Total	**Male**	**Female**	Total
Institutions of Higher Education	ASU	13 (25%)	38 (75%)	51	13 (25%)	40 (75%)	53
	CRU	41 (69%)	18 (31%)	59	18 (37%)	31 (63%)	49
	Total	54 (49%)	56 (51%)	110	31 (30%)	71 (70%)	102

3.8.1 Questionnaire: Analysis approach

The data obtained from the 7-point Likert closed-ended questions were analysed by the use of participant's total average of scores on the 11 statements about troublesome, transformative, irreversible, integrative and discursive characteristics to measure the level of participants' awareness of them in general. As for the data generated from the open-ended questions, they were generated from responses on the areas of troublesome concepts, reasons why troublesome, strategies used to overcome difficulty and transformative concepts reported by the four groups of participants as shown in Table 3.8.

Table 3.8 Sets of responses

Groups	Troublesome Concepts Reported	Reasons why troublesome	Strategies used	Transformative Concepts Reported
ASU Y1 Students	✓	✓	✓	✓
ASU Y1 Students	✓	✓	✓	✓
CRU Y4 Students	✓	✓	✓	✓
CRU Y4 Students	✓	✓	✓	✓

Each group of participants was asked to write the three most troublesome concepts they had faced in their study and the reasons why they found them difficult. They were also asked to write down the strategies they had used to overcome those difficulties. Finally, they were asked to write the three most transformative educational concepts they had experienced in their teacher education programme. Data received were analysed using a compare and contrast analysis between the troublesome and transformative sets of responses. As we can see in figure 3.1, troublesome and transformative concepts as reported by Y1 participants were compared at each college, and then a list of potential threshold concepts was generated. The same procedure was used to generate a list of potential threshold concepts in Y4. Both lists (Y1 and Y4) were compared and contrasted in order to get a finalised list of potential threshold concepts at ASU and CRU. Finally, the finalised list of ASU and the finalised one from CRU were compared and contrasted in order to establish a final list of potential threshold concepts in teacher education.

The final list of potential threshold concepts was emailed to the instructors at both ASU and CRU to confirm whether or not the list had some of the most important educational concepts in teacher education. Based on the final list, a thematic analysis was finally conducted of interview data to identify whether those educational concepts reported in the final list can be identified as threshold concepts in teacher education. Figure 3.1 illustrates how data generated from the open-ended questions were analysed.

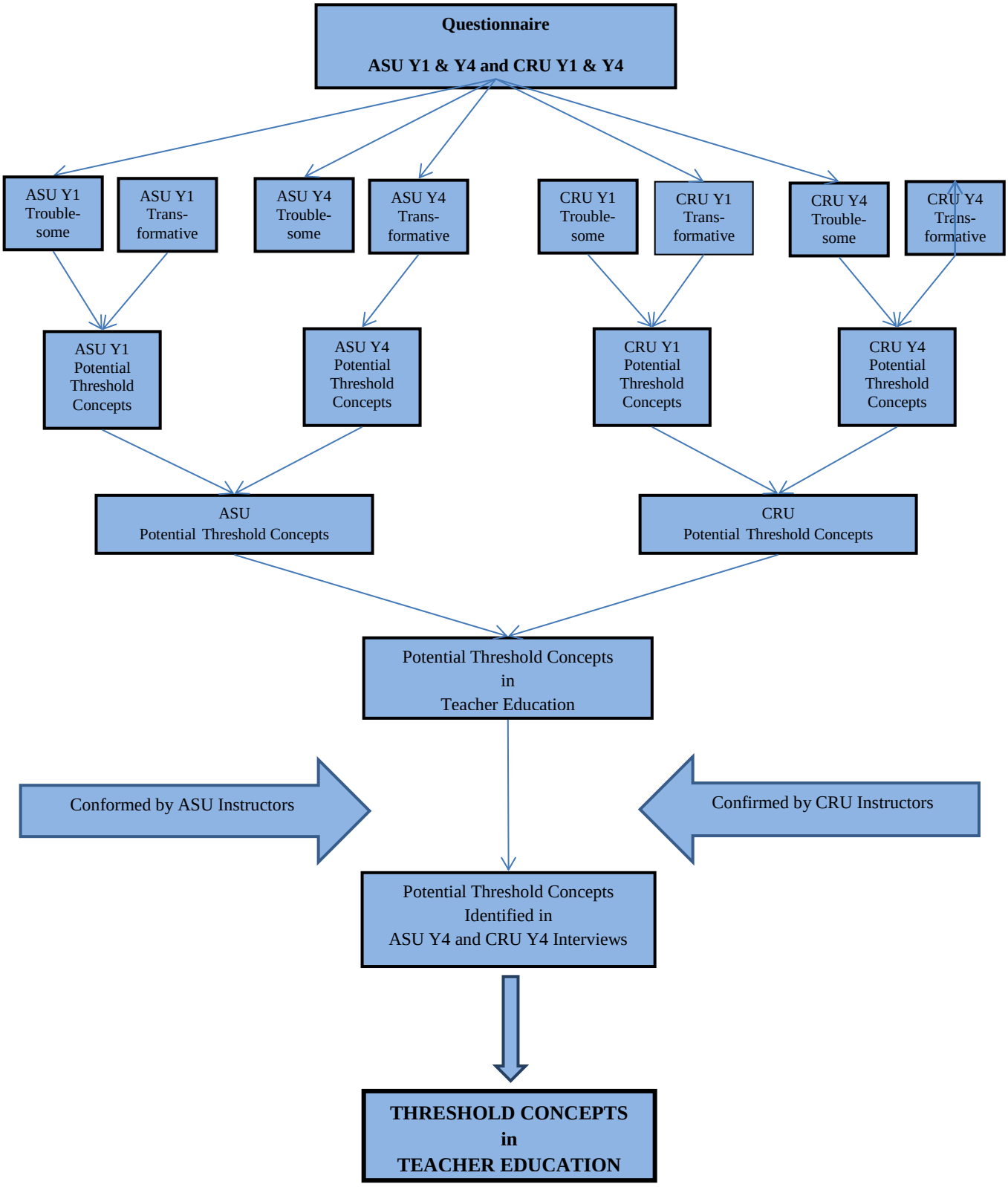

Figure 3.1 Approach used to analyse quantitative data

As part of the questionnaire was based on open-ended questions where there could be too many different answers to the questions related to troublesome and transformative educational concepts experienced by Y1 and Y4 participants, a system of coding was created in SPSS for frequency-based statistics in order to establish a list of the most frequent troublesome and transformative concepts as reported by Y1 and Y4 participants at ASU and CRU. To do so, each of the eight sets of responses was recorded in SPSS separately, and then the most frequent responses were analysed based on frequency. After the SPSS had generated the list of all responses from the highest to the lowest frequency, the ten highest frequent concepts of each study group participants were recorded on lists. The reason for selecting the ten highest frequent concepts was due to the fact that participants, as expected, reported a wide range of concepts which made it impossible for a few concepts to have received the majority of answers. Furthermore, the analysis was based on a three-phase process of comparison and contrast (troublesome-transformative, Y1-Y4 and ASU-CRU), and this practically narrowed down the list of potential threshold concepts in teacher education as it eliminated many concepts which were not reported as transformative.

It is important to highlight the following three points. As transformative is the most important characteristic of threshold concepts without which a concept cannot be identified as a threshold concept (Land et al., 2016), any troublesome concept that had not been expressed as transformative by participants was excluded from being considered a potential threshold concept. In addition, transformative concepts reported by Y4 students were the ones that would be considered potential threshold concepts in teacher education. In other words, transformative concepts reported by Y1 participants would be compared to

those of transformative concepts expressed by Y4 participants at the same college. If they were not reported by Y4 participants, they would be excluded due to the fact that they lost their transformative effect when students progressed to Y4. However, they could be only threshold concepts in the context of Y1, which was not the main concern of this research study. The final point that should be addressed is how participants' responses were reported in the analysis chapter. As irreversible and discursive are characteristics of a threshold concept, participants' answers to the three most difficult and transformative concepts were reported as they were written in order to maintain rigorous measures when a compare and contrast analysis was conducted. To illustrate, if a student recorded *dealing with students* as a difficult concept, it would not be reported as *classroom management*, which could be mentioned by another participant. If a participant failed to remember an educational concept such as *classroom management* and used *dealing with students* instead, the irreversible and discursive characteristics were not addressed. Ignoring this would have contaminated the data generated in this research study, which targeted potential threshold concepts in teacher education.

3.8.2 Interview Analysis Approach

The interview analysis was based on the thematic analysis of the potential threshold concepts that had been generated from the quantitative findings. Twenty Y4 student teachers at ASU and CRU were interviewed about troublesome and transformative educational concepts without being given any information about the findings of the quantitative analysis. As Table 3.9 shows, 20 Y4 student teachers volunteered to take part in the interviews: 10 at ASU and 10 at CRU. In total, 11 male interviewees participated and they represented

55% of the total participants, whereas 9 female interviewees took part in the study and they comprised 45%. College-wise, 5 male and 5 female interviewees were interviewed at ASU, whereas 6 male and 4 female participants took part in the interviews at CRU. This indicates that the voices of male and female teachers were represented fairly.

Table 3.9 Information about Y4 interviewees

	Y4	Y4	Total
	Male	Female	-
ASU	5 (50%)	5 (50%)	10
CRU	6 (60%)	4 (40%)	10
Total	11 (55%)	9 (45%)	20

3.9 Conclusion

This chapter described the rationale of implementing a mixed methods approach for the investigation of identifying threshold concepts in teacher education. As discussed, the use of questionnaire and interview was regarded a good combination of triangulating data from quantitative and qualitative perspectives. The research design of this study started with the questionnaire phase at ASU and CRU and then the interview sessions. The data obtained from the data collection instruments were compared and contrasted in order to establish a final list of threshold concepts in teacher education. Some ethical and research issues this research study encountered were also addressed. After highlighting the process of how data were analysed, the next chapter presents the findings of data analysis in detail.

CHAPTER 4: ANALYSIS OF DATA

PART 1: Data Analysis and Findings of Quantitative Data

4.1 Introduction to Quantitative Data

This chapter (Part 1) describes the analysis of data and findings derived from the questionnaire distributed to Y1 and Y4 student teachers at ASU and CRU. The following sections present first the data generated at ASU and then the data obtained at CRU. The purpose of this analysis was to identify potential threshold concepts in teacher education.

4.1.1 Analysis of Quantitative Data: Questionnaire

A total of 212 Y1 and Y4 participants responded to the questionnaire items. The questionnaire was designed to: 1) measure participants' level of awareness of threshold concepts in general, 2) collect data on troublesome knowledge and reasons why troublesome knowledge was found difficult, 3) collect data on strategies used to overcome difficulty, and 4) collect data on transformative concepts. The following sections present the analysis of the research data.

4.1.2 Level of Awareness of the Characteristics of Threshold Concepts

A questionnaire was distributed to 212 Y1 and Y4 student teachers at two Omani colleges (ASU and CRU). The first question consisted of 7-point Likert scale statements (1 at the lowest level, 7 at the highest, 5 neutral) which measured participants' level of awareness of the characteristics of threshold concepts in general. Figure 4.1 shows that participants have a relatively high level of awareness of educational concepts in terms of transformative, integrative and discursive effects, where the average scores are between 5 and 6. On the other hand, the level of awareness of troublesome concept receives

the lowest average scores ranging from 4 among ASU Y1 and Y4 participants to 4.6 among CRU Y1 and Y4 participants. Also, the awareness level of irreversible across the groups shows a slightly high level with average scores around 5, making it the second characteristic with the lowest scores. The statistical means of responses of the four groups in each variable are very close regardless of the different years of study and different teaching contexts. To sum up, there is some certain level of awareness of the characteristics of threshold concepts in general varied from relatively high on discursive, integrative and transformative to slightly high on troublesome and irreversible.

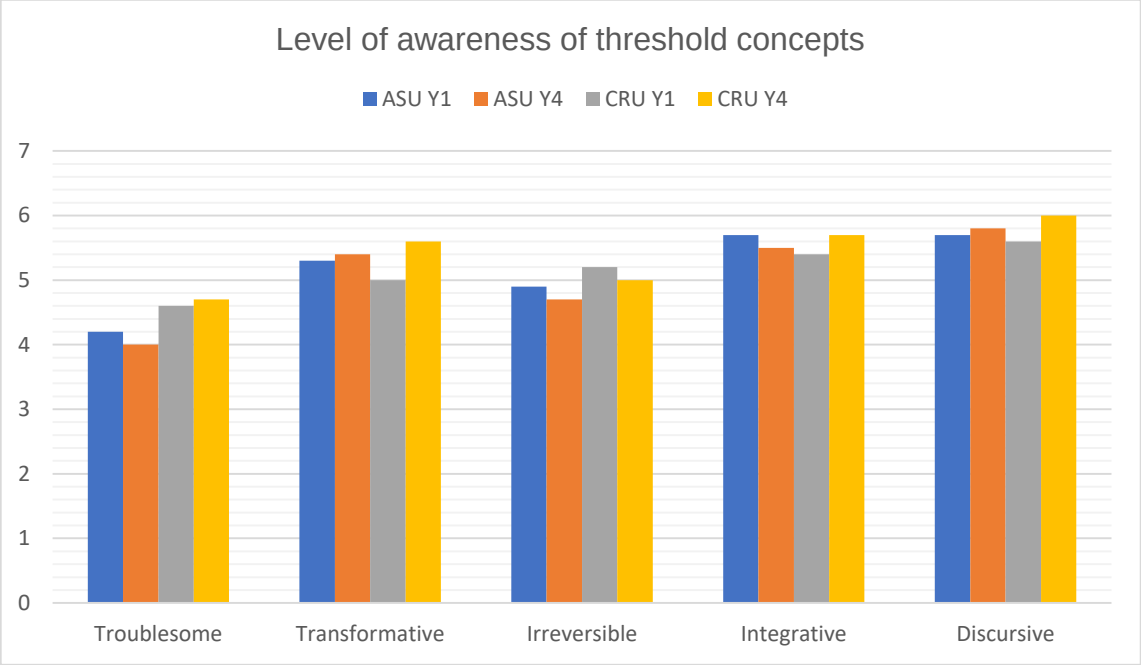

Figure 4.1 Level of participants' awareness of the characteristics of threshold concepts

4.1.3 Questionnaire: Open-ended Questions at ASU

4.1.3.1 Analysis of ASU Y1 Data

A questionnaire was distributed to ASU Y1 student teachers who were studying their BA degree in teacher education. Fifty-one students volunteered to participate in the study. They were asked to respond to the following three questions:

1. What are the three most difficult concepts you have faced in your teacher education programme? Why did you find them difficult? Please write your answers in the box below.

2. What strategies did you use to overcome these difficulties and understand these concepts?

3. Have you come across any concepts in your teacher education programme which, once understood, had a huge impact on your life? Please list up to three concepts, using single words or short phrases.

Data were analysed statistically using SPSS which refers to student teachers who took part as (participants) and their answers as (responses). It is important to highlight that each of the 51 participants was expected to provide three answers for each question, which were analysed separately. In other words, the 51 participants were expected to provide a total of 153 responses for each of the questions about troublesome concepts, strategies used to overcome troublesome knowledge and transformative concepts.

As the questions regarding troublesome and transformative concepts were the most salient parts of the questionnaire, the following three sections report the most difficult concepts, strategies used to overcome difficult concepts and transformative educational concepts expressed by ASU Y1 participants. The

findings for reasons why those concepts were found difficult are reported after a final list of potential threshold concepts in teacher education is proposed.

4.1.3.1.1 Most Troublesome Concepts Reported by ASU Y1 Participants

A total of 51 ASU Y1 participants were asked to record the three most difficult educational concepts they had encountered in their study. The total number of their responses was 97 out of 153 possible answers. Table 4.1 shows that *grammar* received the highest frequency as a troublesome concept after it was reported by 13 ASU Y1 participants, whose answers represent 13.4% of the total responses and 25.5% of the total participants. It was followed by *academic writing* as the 2nd highest troublesome concept with 6.2% of the total responses. The concept of *vocabulary* was in 3rd place as expressed by 4 students whose answers represent 4.1% of the total responses. In 4th, 5th, 6th and 7th places came *critical thinking, educational research, linguistics, and progressive (tense)* respectively with 3.1% of the total responses. From 8th to 15th places, the concepts of *academic reading, argumentative essay, clauses, math, paraphrasing, philosophy, philosophy of education* and *translation* received 2 responses, which represent 2.1% of the total responses. A group of 46 concepts were reported only by 1 participant, and they comprise 47.4% of the total responses. Out of 153 possible answers, ASU Y1 participants reported 97 responses, which represent 63.4%, whereas they failed to provide answers in 56 cases of no attempt, which indicate 36.6% of the total possible answers. To conclude, the statistics show a wide range of educational concepts that were reported as troublesome in ASU Y1 context.

Table 4.1 Most troublesome educational concepts reported by ASU Y1 participants

		Responses		Participants
		N	%	%
Most troublesome concepts (ASU Y1)	Grammar	13	13.4%	25.5%
	Academic Writing	6	6.2%	11.8%
	Vocabulary	4	4.1%	7.8%
	Critical Thinking	3	3.1%	5.9%
	Educational Research	3	3.1%	5.9%
	Linguistics	3	3.1%	5.9%
	Progressive (tense)	3	3.1%	5.9%
	Academic Reading	2	2.1%	3.9%
	Argumentative Essay	2	2.1%	3.9%
	Clauses	2	2.1%	3.9%
	Math	2	2.1%	3.9%
	Paraphrasing	2	2.1%	3.9%
	Philosophy	2	2.1%	3.9%
	Philosophy of Education	2	2.1%	3.9%
	Translation	2	2.1%	3.9%
	Others	46	47.4%	-
	Total responses	**97**	**63.4%**	**-**
	No attempt	**56**	**36.6%**	**-**
	All possible answers	**153**	**100%**	**-**

4.1.3.1.2 Strategies Used to Overcome Troublesome Knowledge

In the same questionnaire, the ASU Y1 participants were asked to provide responses to the question of the three strategies they had used to overcome and understand difficult concepts. They managed to provide 111 responses out of 153 possible answers. As Table 4.2 shows, the strategy of *Ask others to help* was the most practised strategy used by ASU Y1 participants with a frequency of 20, which represents 18% of the total responses. It was followed closely in 2nd place by the strategy of *Read more about the concepts,* which received 18 responses representing 16.2% of the total responses. The strategies of *Do more practice to understand* and *Ask my teachers to clarify* came in 3rd and 4th places with 16 responses (14.4%) and 15 responses (13.5%) respectively. In 5th place was the strategy of *Watch educational videos* with a frequency of 10 responses that indicates 9% of the total responses. The strategy of *Search the internet for the concepts* received 6 responses, which made it in 6th place, followed by the strategy of *Study hard to understand* in 7th place with a total of 5 responses. With only 3 responses, the strategies of *Memorise the concepts* and *Translate the concepts into Arabic* made it to the list in 8th and 9th places. A group of strategies (Others) received nor more than 2 responses (15 in total), and they comprise 13.5% of the total responses. Out of 153 possible answers, ASU Y1 recorded a total of 111 responses, which represent 72.5%. On the other hand, they showed no attempt in 42 cases representing 27.5% out of the total possible answers.

Table 4.2 Strategies used to overcome troublesome knowledge reported by ASU Y1 participants

		Frequency	Percent
Most Strategies (ASU Y1)	Ask others to help	20	18%
	Read more about the concepts	18	16.2%
	Do more practice to understand	16	14.4%
	Ask my teachers to clarify	15	13.5%
	Watch educational videos	10	9%
	Search the internet for the concepts	6	5.4%
	Study hard to understand	5	4.5%
	Memorise the concepts	3	2.7%
	Translate the concepts into Arabic	3	2.7%
	Others	15	13.5%
	Total responses	**111**	**72.5%**
	No attempt	**42**	**27.5%**
	All possible answers	**153**	**100%**

4.1.3.1.3 Most Transformative Concepts Reported by ASU Y1 Participants

The 51 ASU Y1 participants were asked to answer the question about the three most transformative concepts which had impacted their lives. As a result, they provided a total of 88 responses out of 153 possible answers. As shown in Table 4.3, a group of 6 students, representing 11.8% of the total participants, reported the concept of *critical thinking*, and this made it the most transformative concept on the list with 6.8% of the total responses. The concepts of *education, educational research*, and *argumentative essay* came in 2nd, 3rd and 4th places with 3 responses for each, indicating 3.4% of the total responses. From 5th to 9th places, we can see the concepts of *academic writing, motivation, paraphrasing, philosophy,* and *progressive (tense)*, which were reported by only 2 respondents whose answers represent 2.3% of the total responses. As for the other concepts, 63 concepts (Others) were reported only by 1 participant, and they represent 71.6% of the total responses (88). As a result, there were no concepts that could be placed in 10th place. Out of 153 possible answers, ASU Y1 participants responded with 88 answers, which comprise 57.5%. On the other hand, they failed to report transformative concepts in 65 cases of no attempt, and this indicates more than a third of the total possible answers (42.5%). To sum up, the data show a wide range of educational concepts that were deemed as transformative by ASU Y1 participants.

Table 4.3 Most transformative educational concepts reported by ASU Y1 participants

		Responses		Participants
		N	%	%
Most transformative concepts (ASU Y1)	Critical Thinking	6	6.8%	11.8%
	Education	3	3.4%	5.9%
	Educational Research	3	3.4%	5.9%
	Argumentative Essay	3	3.4%	5.9%
	Academic Writing	2	2.3%	3.9%
	Motivation	2	2.3%	3.9%
	Paraphrasing	2	2.3%	3.9%
	Philosophy	2	2.3%	3.9%
	progressive (tense)	2	2.3%	3.9%
	Others	63	71.6%	-
	Total responses	**88**	**57.5%**	**-**
	No attempt	**65**	**42.5%**	**-**
	All possible answers	**153**	**100%**	**-**

In order to arrive at a list of potential threshold concepts in ASU Y1 context, the top troublesome and transformative concepts as reported by the ASU Y1 students were compared and contrasted in the next phase.

4.1.3.1.4 Potential Threshold Concepts as Reported by ASU Y1 Students

The troublesome and transformative concepts reported by ASU Y1 participants were compared and contrasted, and an initial list of potential threshold concepts was created. As Table 4.4 shows, the educational concepts of *critical thinking*, *academic writing*, *educational research*, *argumentative essay*, *progressive (tense)*, *paraphrasing*, *and philosophy* were reported both as troublesome and transformative. In total, the concept of *critical thinking* received 9 responses, which made it the most potential threshold concept, followed closely by the concept of *academic writing* in 2nd place with 8 responses. The concept of *educational research* came in 3rd place with 6 responses. In 4th and 5th places were the concepts of *argumentative essay* and *progressive (tense)*. The list of potential threshold concepts in ASU Y1 was completed with the concepts of *paraphrasing, philosophy, education, and motivation* in 6th, 7th, 8th and 9th places. Although *education* and *motivation* were not reported as troublesome, they were expressed as transformative; hence, they were qualified to the next phase of selection. On the other hand, the concept of *grammar*, being reported as the most troublesome knowledge, was not reported as transformative. As a result, it was disqualified with the other concepts such as *vocabulary, linguistics* and *academic reading*, which had no transformative effect on the participants as reported. This elimination procedure addressed the transformative characteristic as a non-negotiable feature of a threshold concept.

Table 4.4 Potential threshold concepts reported by ASU Y1 participants

	Troublesome Concepts (ASU Y1)		**Transformative Concepts (ASU Y1)**		**Potential Threshold Concepts (ASU Y1)**
1	~~grammar (13)~~	1	*critical thinking (6)	1	*critical thinking (9)
2	*academic writing (6)	2	education (3)	2	*academic writing (8)
3	~~vocabulary (4)~~	3	*educational research (3)	3	*educational research (6)
4	*critical thinking (3)	4	*argumentative essay (3)	4	*argumentative essay (5)
5	*educational research (3)	5	*academic writing (2)	5	*progressive (tense) (5)
6	~~linguistics (3)~~	6	motivation (2)	6	*paraphrasing (4)
7	*progressive (tense) (3)	7	*paraphrasing (2)	7	*philosophy (4)
8	academic reading (2)	8	*philosophy (2)	8	education (3)
9	*argumentative essay (2)	9	*progressive (tense) (2)	9	motivation (2)
10	~~clauses (2)~~				
11	~~math (2)~~				
12	*paraphrasing (2)				
12	*philosophy (2)				
13	~~philosophy of education (2)~~				
14	~~translation (2)~~				

** reported both as troublesome and transformative*

4.1.3.2 Analysis of ASU Y4 Data

The same questionnaire that was given to ASU Y1 student teachers was distributed to 53 Y4 student teachers at ASU who participated in the study voluntarily. They were asked to answer the following questions:

1. What are the three most difficult concepts you have faced in your teacher education programme? Why did you find them difficult? Please write your answers in the box below.

2. What strategies did you use to overcome these difficulties and understand these concepts?

3. Have you come across any concepts in your teacher education programme which, once understood, had a huge impact on your life? Please list up to three concepts, using single words or short phrases.

Data were analysed statistically by the use of SPSS which refers to student teachers who participated as (participants) and their answers as (responses). It is important to highlight that each of the 53 participants was expected to provide three answers for each question, which were analysed separately. Therefore, the 53 participants were expected to provide a total of 159 responses to each of the questions about troublesome concepts, strategies used to overcome troublesome knowledge and transformative concepts.

As the questions of troublesome and transformative concepts were the salient parts of the questionnaire, the following three sections report the most difficult concepts, strategies used to overcome difficult concepts and transformative educational concepts expressed by ASU Y4 participants. The findings for reasons why those concepts were difficult are reported after a final list of potential threshold concepts in teacher education is proposed.

4.1.3.2.1 Most Troublesome Concepts Reported by ASU Y4 Participants

A group of 53 ASU Y4 participants were asked to record the three most difficult educational concepts they had encountered in their teacher education programme. They managed to provide 129 responses out of 159 possible answers. Table 4.5 shows that *pedagogy* was reported as the most difficult concept as it received 7 responses, which represent 5.4% of the total responses and 13.2% of total participants. It was followed by the concept of *measurement*

in 2nd place with 6 responses indicating 4.6% of the total responses and 11.3% of total participants. The concept of *syllabus design* came in 3rd place as reported by 5 participants whose responses represent 3.9% of the total responses. In 4th and 5th places, there were the concepts of *philosophy of education* and *teaching methods*, both received 4 responses which indicate 3.1% of the total responses. From 6th to 10th places, the concepts of *approach, audio-lingual method, classroom management, desuggestopedia,* and *validity* managed to enter the list of troublesome concepts after they received 3 responses each. There were other concepts reported as troublesome by no more than 2 participants, and their 88 responses comprise 68.2% of the total responses recorded. Out of 159 possible answers, ASU Y4 participants recorded 129 responses, which indicate 81.1%. On the other hand, there were 30 cases of no attempt, which represent only 18.9% of total possible answers. Compared to the cases of no attempt on troublesome recorded by ASU Y1 (n=56 and 36.6%), there were more attempts made by ASU Y4 participants to identify troublesome knowledge by a significant increase of 17.7%. All in all, the statistics show that ASU Y4 reported a wide range of educational concepts which were expressed as troublesome.

Table 4.5 Most troublesome educational concepts reported by ASU Y4 students

		Responses		Participants
		N	%	%
Most troublesome concepts (ASU Y4)	Pedagogy	7	5.4%	13.2%
	Measurement	6	4.6%	11.3%
	Syllabus Design	5	3.9%	9.4%
	Philosophy of Education	4	3.1%	7.5%
	Teaching Methods	4	3.1%	7.5%
	Approach	3	2.3%	5.7%
	Audio-lingual Method	3	2.3%	5.7%
	Classroom Management	3	2.3%	5.7%
	Desuggestopedia	3	2.3%	5.7%
	Validity	3	2.3%	5.7%
	Others	88	68.2%	-
	Total responses	**129**	**81.1%**	**-**
	No attempt	**30**	**18.9%**	**-**
	All possible answers	**159**	**100%**	**-**

4.1.3.2.2 Strategies Used to Overcome Troublesome Knowledge

In the same questionnaire, the 53 ASU Y4 participants were asked to provide three strategies they had used to overcome and understand difficult concepts. They provided 142 responses out of 159 possible answers. As shown in Table 4.6, the strategy of *Read more about the concepts* was the most used strategy as it was reported 25 times, which represent 17.6% of the total responses. It was followed closely by the strategy of *Ask my teachers to clarify* in 2nd place,

which received a frequency of 22 responses representing 15.5% of the total responses. In 3rd place came the strategy of *Watch educational videos* with 16 responses, which comprise 11.3%. The strategies of *Ask others to help* (15 responses) and *Search the internet for the concepts* (13 responses) came in 4th and 5th places representing 10.6% and 9.1% of the total responses respectively. From 6th and 9th places were the strategies of *Relate the concepts to real life, Study examples, Translate the concepts into Arabic* and *Use a dictionary* as they received 5 responses. They were followed by the strategy of *Memorise the concepts* in 10th place scoring 4 responses, which indicate 2.8% of the total responses. A group of other strategies were reported by less than 4 participants, whose 27 responses comprise 19% of the total responses. Out of 159 possible answers, ASU Y4 participants provided 142 responses, which represent 89.3%, whereas there were only 17 cases of no attempt indicating only 10.7% of the total possible answers. Compared to the cases of no attempt reported by ASU Y1 participants (n=42, 27.5%), there was a drop by 16.8% of no attempt cases as reported by ASU Y4 participants.

Table 4.6 Strategies used to overcome troublesome knowledge reported by ASU Y4 participants

		Frequency	Percent
Most strategies used (ASU Y4)	Read more about the concepts	25	17.6%
	Ask my teachers to clarify	22	15.5%
	Watch educational videos	16	11.3%
	Ask others to help	15	10.6%
	Search the internet for the concepts	13	9.1%
	Relate the concepts to real life	5	3.5%
	Study examples	5	3.5%
	Translate the concepts into Arabic	5	3.5%
	Use a dictionary	5	3.5%
	Memorise the concepts	4	2.8%
	Others	27	19%
	Total responses	**142**	**89.3%**
	No attempt	**17**	**10.7%**
	All possible answers	**159**	**100.0**

4.1.3.2.3 Most Transformative Concepts Reported by ASU Y4 Participants

The 53 ASU Y4 participants were asked to record the three most transformative educational concepts they had experienced in their teacher education programme. They provided a total of 144 responses out of 159 possible answers. Table 4.7 shows that the concept of *behaviourism* came in 1st place after it was reported by 6 students who represent 11.3% of total participants, and their responses indicate 4.2% of the total responses. From 2nd to 7th places, a total of 5 participants expressed that the concepts of *assessment, classroom*

management, communicative approach, critical thinking, learner-centred approach and *task-based approach* had huge impact on their life. Their 5 responses for each concept represent 3.5% of the total responses. The list was completed with the educational concepts of *constructivism, individual differences, motivation* and *teaching methods* (8^{th} to 11^{th} places) after they received 4 responses representing 2.8% of the total responses and 7.5% of the total number of participants. Other concepts were reported as transformative by three or fewer participants, whose 92 responses indicate 63.9% of the total responses. Out of 159 possible answers, ASU Y4 participants reported 144 responses representing 90.6% of the total possible answers. On the other hand, only 15 cases of no attempt were recorded, and they represent only 9.4% of the total possible answers. Compared to ASU Y1 participants' no attempt cases (n=65, 42.4%), there was a dramatic decrease by 33% of no attempt cases among ASU Y4 participants. To sum up, the statistics show that ASU Y4 participants reported a wide range of educational concepts which were experienced as transformative.

Table 4.7 Most transformative educational concepts reported by ASU Y4 participants

		Responses		Participants
		N	%	%
Most transformative concepts (ASU Y4)	Behaviourism	6	4.2%	11.3%
	Assessment	5	3.5%	9.4%
	Classroom Management	5	3.5%	9.4%
	Communicative Approach	5	3.5%	9.4%
	Critical Thinking	5	3.5%	9.4%
	Learner-centred Approach	5	3.5%	9.4%
	Task-based Approach	5	3.5%	9.4%
	Constructivism	4	2.8%	7.5%
	Individual Differences	4	2.8%	7.5%
	Motivation	4	2.8%	7.5%
	Teaching Methods	4	2.8%	7.5%
	Others	92	63.9%	-
	Total responses	**144**	**90.6%**	**-**
	No attempt	**15**	**9.4%**	**-**
	All possible answers	**159**	**100%**	**-**

4.1.3.2.4 Potential Threshold Concepts as Reported by ASU Y4 Students

The transformative concepts generated from ASU Y4 data were compared and contrasted with the troublesome concepts reported by the same participants in order to establish an initial list of potential threshold concepts in the context of ASU Y4. Table 4.8 shows that *classroom management and teaching methods* were the only concepts that were reported both as troublesome and

transformative in ASU Y4 context. Because of that, they topped the initial list of potential threshold concepts with 8 responses each. In 3rd place came the concept of *behaviourism* as it received 6 responses. It was followed by the concepts of *assessment, communicative approach, critical thinking, learner-centred approach,* and *task-based approach* in 4th, 5th, 6th, 7th and 8th places with 5 responses received from being transformative. From 9th to 11th places, the concepts of *constructivism, individual differences* and *motivation* remained with the same 4 responses received when they were reported as transformative. On the other hand, most of the troublesome concepts such as *pedagogy, measurement* and *syllabus design* were not reported as transformative by ASU Y4 participants. Accordingly, they were excluded from the next phase of selection.

Table 4.8 Potential threshold concepts reported by ASU Y4 participants

	Troublesome Concepts (ASU Y4)		**Transformative Concepts (ASU Y4)**		**Potential Threshold Concepts (ASU Y4)**
1	~~pedagogy (7)~~	1	behaviourism (6)	1	*classroom management (8)
2	~~measurement (6)~~	2	assessment (5)	2	*teaching methods (8)
3	~~syllabus design (5)~~	3	*classroom management (5)	3	behaviourism (6)
4	~~philosophy of education (4)~~	4	communicative approach (5)	4	assessment (5)
5	*teaching methods (4)	5	critical thinking (5)	5	communicative approach (5)
6	~~approach (3)~~	6	learner-centred approach (5)	6	critical thinking (5)
7	~~audio-lingual method (3)~~	7	task-based approach (5)	7	learner-centred approach (5)
8	*classroom management (3)	8	constructivism (4)	8	task-based approach (5)
9	~~desuggestopedia (3)~~	9	individual differences (4)	9	constructivism (4)
10	~~validity (3)~~	10	motivation (4)	10	individual differences (4)
		11	*teaching methods (4)	11	motivation (4)

**Reported both as troublesome and transformative*

4.1.3.3 Potential Threshold Concepts in ASU Teacher Education

As Y4 was the base for identifying potential threshold concepts in teacher education in this research study, the initial list of potential threshold concepts in ASU Y4 context was compared and contrasted with the initial list of potential threshold concepts in ASU Y1 context in order establish a finalised list of potential threshold concepts in the context of ASU teacher education programme. Table 4.9 shows that only two educational concepts appeared on the two lists, which were *critical thinking* and *motivation*. Therefore, it can be argued that they are highly likely to be threshold concepts in teacher education. The concept of *critical thinking* was reported as the most potential threshold concept at ASU as it received 14 responses in total (troublesome and transformative combined), and was also reported as the most potential threshold concept in the ASU Y 1 context. The concepts of *classroom management* and *teaching methods* were reported in 2nd and 3rd places with a total of 8 responses each, and they were the most transformative educational concepts as expressed by ASU Y4 participants. They were followed by the concepts of *behaviourism* and *motivation* in 4th and 5th places with 6 responses each. From 6th to 9th places, we can see the concepts of *assessment, communicative approach, learner-centred approach* and *task-based approach* after receiving 5 responses from being transformative. The finalised list of potential threshold concepts in the context of ASU teacher education programme was completed with the concepts of *constructivism* and *individual differences* in 10th and 11th places as they remained with the 4 responses they received in the ASU Y4 transformative list.

Table 4.9 Potential threshold concepts at ASU

	Potential Threshold Concepts (ASU Y1)		Potential Threshold Concepts (ASU Y4)		**Potential Threshold Concepts at ASU**
1	*critical thinking (9)	1	classroom management (8)	**1**	*critical thinking (14)
2	academic writing (8)	2	teaching methods (8)	**2**	classroom management (8)
3	educational research (6)	3	behaviourism (6)	**3**	teaching methods (8)
4	argumentative essay (5)	4	assessment (5)	**4**	behaviourism (6)
5	progressive (tense) (5)	5	communicative approach (5)	**5**	*motivation (6)
6	paraphrasing (4)	6	*critical thinking (5)	**6**	assessment (5)
7	philosophy (4)	7	learner-centred approach (5)	**7**	communicative approach (5)
8	education (3)	8	task-based approach (5)	**8**	learner-centred approach (5)
9	*motivation (2)	9	constructivism (4)	**9**	task-based approach (5)
		10	individual differences (4)	**10**	constructivism (4)
		11	*motivation (4)	**11**	individual differences (4)

** reported by both ASU Y1 and ASU Y4*

4.1.4 Questionnaire: Open-ended Questions at CRU

4.1.4.1 Analysis of CRU Y1 Data

The same questionnaire that was given to ASU Y1 and Y4 student teachers was distributed to Y1 student teachers who were studying their English Language teacher education BA degree at CRU. Fifty-nine student teachers volunteered and were asked to respond to the following questions:

1. What are the three most difficult concepts you have faced in your teacher education programme? Why did you find them difficult? Please write your answers in the box below.

2. What strategies did you use to overcome these difficulties and understand these concepts?

3. Have you come across any concepts in your teacher education programme which, once understood, had a huge impact on your life? Please list up to three concepts, using single words or short phrases.

SPSS was used for the statistical analysis of the data where student teachers who participated were referred to as (participants) and their answers as (responses). It is important to highlight that each of the 59 participants was expected to provide three answers for each question, which were analysed separately. In other words, the 59 participants were expected to provide 177 responses to each of the questions about troublesome concepts, strategies used and transformative concepts.

As the questions of troublesome and transformative concepts were the salient parts of the questionnaire, the following three sections report the most difficult concepts, strategies used to overcome difficult concepts and the transformative concepts expressed by CRU Y1 participants. The findings of reasons of difficulty are reported after a final list of potential threshold concepts in teacher education is proposed.

4.1.4.1.1 Most Troublesome Concepts Reported by CRU Y1 Participants

In response to the question about the three most difficult educational concepts they had encountered in their study, Table 4.10 shows CRU Y1 participants provided a total of 124 responses out of 177 possible answers. As for the most difficult concepts, 18 participants, who represent 30.5% of the total participants, reported that the concept of *phonetics* was the most troublesome concept they had faced, and this represents 14.5% of the total responses. It was followed by the concept of *English literature* in 2nd place as expressed by 11 participants (18.6%), whose responses indicate 8.9% of the total responses. In 3rd place

came the concept of *academic reading* with 9 responses, and this represents 7.2% of the total responses. The concept of *Academic writing* was reported by 8 participants and it was placed in 4th place, receiving a percentage of 6.4% of the total responses. The concepts of *IT* and *linguistics* came in 5th and 6th places as reported by 7 participants, whose responses represent 5.6% of the total responses. In 7th and 8th places came the concepts of *phonology* and *pronunciation*, which received 5 responses indicating 4% of the total responses. From 9th to 10th places, participants reported the concepts of *academic listening* and *vocabulary* amongst the most troublesome concepts with 4 responses for each, and this represents 3.2% of the total responses and 6.8% of the total participants. Other concepts that received 3 responses or fewer appeared 46 times in total, and they comprise 37.1% of the total responses. Out of 177 possible answers, CRU Y1 participants reported 124 responses, which represent 70.1%. On the other hand, the cases of no attempt were 53, and they indicate 29.9% of the total possible answers. To sum up, the data show that CRU Y1 participants reported a large number of concepts as troublesome.

Table 4.10 Most troublesome educational concepts reported by CRU Y1 participants

		Responses		Participants
		N	%	%
Most troublesome concepts (CRU Y1)	Phonetics	18	14.5%	30.5%
	English Literature	11	8.9%	18.6%
	Academic Reading	9	7.2%	15.2%
	Academic Writing	8	6.4%	13.5%
	IT	7	5.6%	11.9%
	Linguistics	7	5.6%	11.9%
	Phonology	5	4%	8.5%
	Pronunciation	5	4%	8.5%
	Academic Listening	4	3.2%	6.8%
	Vocabulary	4	3.2%	6.8%
	Others	46	37.1%	-
	Total responses	**124**	**70.1%**	**-**
	No attempt	**53**	**29.9%**	**-**
	All possible answers	**177**	**100%**	**-**

4.1.4.1.2 Strategies Used to Overcome Troublesome Knowledge

CRU Y1 participants were also asked to provide three strategies they had used to overcome the troublesome educational concepts they reported in the previous section. They managed to provide a total of 155 responses out of 177 possible answers. As Table 4.11 shows, the strategy of *Ask others to help* came in 1st place with a frequency of 23 responses, which represen14.8% of the total responses. It was closely followed by the strategy of *Ask my teachers to clarify*

in 2nd with a frequency of 20 responses indicating 12.9% of the total responses. In 3rd place came the strategy of *Read more about the concepts,* which received 15 responses, which comprise 9.7%. It was followed by the strategy of *Search the internet for the concepts* in 4th place as it received 13 responses. The two strategies of *Study hard to understand* and *Watch educational videos* were reported in 5th and 6th places as they received 12 responses (7.7%). They were followed by the strategies of *Do more practice to understand* and *Memorise the concepts* in 7th and 8th places with a total of 10 responses indicating 6.4% of the total responses. The list was completed with the strategies of *Read stories* and *Translate the concepts into Arabic* in 9th and 10th places receiving less than 4 responses which represent 1.9%. A group of other strategies were reported by no more than 2 participants, and they all comprise 21.9% of the total responses. Out of the 177 possible answers, CRU Y1 participants reported a total of 155 responses, and this indicates 87.6%. On the other hand, there were 22 cases of no attempt, which represent 12.4% of the total possible answers.

Table 4.11 Strategies used to overcome troublesome knowledge reported by CRU Y1 participants

		Frequency	Percent
Most strategies Used in CRU Y1	Ask others to help	23	14.8%
	Ask my teachers to clarify	20	12.9%
	Read more about the concepts	15	9.7%
	Search the internet for the concepts	13	8.4%
	Study hard to understand	12	7.7%
	Watch educational videos	12	7.7%
	Do more practice to understand	10	6.4%
	Memorise the concepts	10	6.4%
	Read stories	3	1.9%
	Translate the concepts into Arabic	3	1.9%
	Others	34	21.9%
	Total responses	**155**	**87.6%**
	No attempt	**22**	**12.4%**
	All possible answers	**177**	**100.0**

4.1.4.1.3 Most Transformative Concepts Reported by CRU Y1 Participants

The same 59 CRU Y1 participants were asked about the three most transformative concepts they had experienced during their studies. Table 4.12 shows that they provided a total of 126 responses out of 177 possible answers. In 1st place, the concept of *phonetics*, once again, was reported as the most transformative by 13 participants, who represent 22% of the total participants and their answers comprise 10.3% of the total responses. With a percentage of 6.3% of the total responses and 13.5% of the total participants, the concept of

academic reading came in 2nd place. It was followed by the concept of *linguistics* in 3rd place with 7 responses (5.5%). The concept of *grammar* was expressed by 5 participants (8.5%) as a transformative concept, and this places it in 4th place. In 5th and 6th places came the concepts of *globalisation* and *phonology*, which were reported by 4 participants, whose answers represent 3.2% of the total responses. They were followed by the concept of *academic writing* in 7th place as it received 3 responses, which represent 2.4% of the total responses. The concepts of *different opinions, IT, self-confidence* and *speaking* were reported by only 2 participants (1.6% of the total responses and 3.4% of total participants); therefore, they were listed from 8th to 11th places. As for the other 74 concepts mentioned only once, they comprise 58.7% of the total responses (126). Out of 177 possible answers, CRU Y1 participants provided 126 responses representing 71.2%. On the other hand, there were 51 cases of no attempt, which indicate 28.8% of the total possible answers. All in all, the statistics show that CRU Y1 participants experienced a wide range of educational concepts as transformative.

Table 4.12 Most transformative educational concepts reported by CRU Y1 participants

		Responses		Participants
		N	%	%
Most transformative concepts (CRU Y1)	Phonetics	13	10.3%	22%
	Academic Reading	8	6.3%	13.5%
	Linguistics	7	5.5%	11.9%
	Grammar	5	4%	8.5%
	Globalisation	4	3.2%	6.8%
	Phonology	4	3.2%	6.8%
	Academic Writing	3	2.4%	5.1%
	Different Opinions	2	1.6%	3.4%
	IT	2	1.6%	3.4%
	Self-confidence	2	1.6%	3.4%
	Speaking	2	1.6%	3.4%
	Others	74	58.7%	-
	Total responses	**126**	**71.2%**	**-**
	No attempt	**51**	**28.8%**	**-**
	All possible answers	**177**	**100%**	**-**

4.1.4.1.4 Potential Threshold Concepts as Reported by CRU Y1 Students

The transformative educational concepts reported by CRU Y1 participants were compared and contrasted with the ones they reported as troublesome concepts in order to establish an initial list of potential threshold concepts in the context of CRU Y1. We could see in Table 4.13 that the concept of *phonetics* was the most important as it was expressed both troublesome and transformative by a total of

31 participants with a margin of 14 responses ahead of the concept in the second place. In addition, it was reported at the top of the two CRU Y1 lists; troublesome concepts and transformative concepts. The concept of *Academic reading* also seemed to be a very important concept regarded by CRU Y1 student teachers as it appeared in 2nd place as a potential threshold concept with a total of 17 responses: 9 responses as being troublesome and 8 responses as being transformative. Furthermore, it was also reported in 2nd place as a transformative concept. It was followed by the concept of *linguistics* in 3rd place, which received a total of 14 responses. The concept of a*cademic writing* came in 4th place with a total of 11 responses. With a total of 9 responses, the concepts of *IT* and *phonology* were also expressed as both transformative and troublesome, and they entered 5th and 6th places respectively. From 7th to 11th places, the concepts of *grammar* (5 responses), *globalisation* (4 responses), *different opinions* (2 responses), *self-confidence* (2 responses), and *speaking* (2 responses) were reported as transformative but not troublesome. However, being reported transformative, they were qualified to the next phase. On the other hand, the other concepts were excluded because they were not reported as transformative such as the cases of *English literature*, *pronunciation*, *academic listening* and *vocabulary*.

Table 4.13 Potential threshold concepts as reported by CRU Y1 participants

	Troublesome Concepts (CRU Y1)		Transformative Concepts (CRU Y1)		Potential Threshold Concepts (CRU Y1)
1	*phonetics (18)	1	*phonetics (13)	1	*phonetics (31)
2	~~English literature (11)~~	2	*academic reading (8)	2	*academic reading (17)
3	*academic reading (9)	3	*linguistics (7)	3	*linguistics (14)
4	*academic writing (8)	4	grammar (5)	4	*academic writing (11)
5	*IT (7)	5	globalisation (4)	5	*IT (9)
6	*linguistics (7)	6	*phonology (4)	6	*phonology (9)
7	*phonology (5)	7	*academic writing (3)	7	grammar (5)
8	~~pronunciation (5)~~	8	different opinions (2)	8	globalisation (4)
9	~~academic listening (4)~~	9	*IT (2)	9	different opinions (2)
10	~~vocabulary (4)~~	10	self-confidence (2)	10	self-confidence (2)
		11	speaking (2)	11	speaking (2)

**reported as both troublesome and transformative*

4.1.4.2 Analysis of CRU Y4 Data

The same questionnaire that was given to ASU Y1, ASU Y4 and CRU Y1 participants was also distributed to CRU Y4 student teachers who were studying their English Language teacher education degree at CRU. Forty-nine students volunteered and were asked to respond to the following questions:

1. What are the three most difficult concepts you have faced in your teacher education programme? Why did you find them difficult? Please write your answers in the box below.

2. What strategies did you use to overcome these difficulties and understand these concepts?

3. Have you come across any concepts in your teacher education programme which, once understood, had a huge impact on your life? Please list up to three concepts, using single words or short phrases.

Data were analysed statistically using SPSS which refers to student teachers who filled in the questionnaire as (participants) and their answers as (responses). It is important to highlight that each of the 49 participants was expected to provide three answers for each question, which were analysed separately. In other words, the 49 participants were expected to provide 147 responses to the questions about troublesome concepts, strategies used to overcome difficult concepts and transformative concepts.

As the questions regarding troublesome and transformative concepts were the most salient parts of the questionnaire, the following three sections report the most troublesome concepts, strategies used to overcome troublesome knowledge, and the transformative educational concepts expressed by CRU Y4 participants. The findings for reasons why those concepts were found the most difficult ones were reported after a final list of potential threshold concepts in teacher education is proposed.

4.1.4.2.1 Most Troublesome Concepts Reported by CRU Y4 Participants

A group of 49 CRU Y4 participants were asked to provide the three most difficult educational concepts they had encountered in their teacher education programme. Table 4.14 shows that participants provided a total of 130 responses out of 147 possible answers. In 1st place came the concept of *teaching methods* which received 11 responses, and this represents 8.5% of the total responses and 22.4% of the total participants. The concept of *validity* was reported by 6 participants in 2nd place, receiving 4.6% of the total responses and

12.2% of the total participants. In 3rd, 4th, 5th and 6th places were the concepts of *classroom management, communicative ability, critical thinking,* and *practicality* as they were reported by 5 participants, and this indicates 3.8% of the total responses for each concept. With a percentage of 3.1% of the total responses, the concepts of *assessment* and *pragmatics* came in 7th and 8th places as they were reported by 4 participants as troublesome knowledge. Receiving 3 responses which represent 2.3% of the total responses and 6.1 of the total participants, a group of 6 educational concepts took the places from 9th to 14th, and they were *curriculum evaluation, error analysis, procedure, rapport with students, reflection,* and *syntax*. A group of other concepts were recorded by less than 3 participants, whose 67 responses comprise 51.5% of the total responses. Out of 147 possible answers, CRU Y4 participants reported a total of 130 responses, which represent 88.4%. On the other hand, they failed to provide answers in 17 cases of no attempt, and this only comprises 11.6% of total possible answers. Compared to CRU Y1 participants' cases of no attempt (n=53, 29.9%), there were less no attempt cases (n=17, 11.6%), and this indicates a significant decrease by 18.3% in the cases of no attempt as CRU Y4 context. Nevertheless, the statistics show a wide range of various educational concepts which CRU Y4 participants reported as troublesome.

Table 4.14 Most troublesome educational concepts reported by CRU Y4 participants

		Responses		Participants
		N	%	%
Most troublesome concepts (CRU Y4)	Teaching Methods	11	8.5%	22.4%
	Validity	6	4.6%	12.2%
	Classroom Management	5	3.8%	10.2%
	Communicative Ability	5	3.8%	10.2%
	Critical Thinking	5	3.8%	10.2%
	Practicality	5	3.8%	10.2%
	Assessment	4	3.1%	8.2%
	Pragmatics	4	3.1%	8.2%
	Curriculum Evaluation	3	2.3%	6.1%
	Error Analysis	3	2.3%	6.1%
	Procedure	3	2.3%	6.1%
	Rapport with Students	3	2.3%	6.1%
	Reflection	3	2.3%	6.1%
	Syntax	3	2.3%	6.1%
	Others	67	51.5%	-
	Total responses	**130**	**88.4%**	**-**
	No attempt	**17**	**11.6%**	**-**
	All possible answers	**147**	**100%**	**-**

4.1.4.2.2 Strategies used to Overcome Troublesome Knowledge

The CRU Y4 participants were also asked to provide three strategies they had used to understand and overcome the troublesome educational concepts they reported in the previous section. They managed to report a total of 138 responses out of 147 possible answers. As seen in Table 4.15, almost half of the participants (n=23, 47%) reported that the strategies of *Ask my teachers to clarify* and *Ask others to help* were the most common strategies used to overcome troublesome knowledge, and this places them in 1st and 2nd places with a percentage of 16.7% of the total responses each. They were closely followed by the strategy of *Search the internet for the concepts* in 3rd place, which received 21 responses comprising 15.2% of the total responses. In 4th place came the strategy of *Read more about the concepts,* which received a frequency of 17 responses indicating 12.3%. With only 8 and 7 responses, the strategies of *Watch educational videos* and *Do more practice to understand* came in 5th and 6th places respectively. Receiving less than 5 responses (less than 3%), the strategies of *Study hard to understand, Translate the concepts into Arabic, Use a dictionary, Memorise the concept* and *Study examples to understand* were placed from 7th to 11th places respectively. A group of other strategies received less than 3 responses, and they comprise 15.2% of the total responses. Out of 147 possible answers, CRU Y4 participants reported 138 responses to the question about strategies used to overcome difficult concepts, and this represents 93.9%. On the other hand, there were only 9 cases of no attempt indicating 6.1% of the total possible answers. Compared to CRU Y1 participants' no attempt cases (n=22, 12.4%), CRU Y4 were able to use strategies by an increase of 6.3%.

Table 4.15 Strategies used to overcome troublesome knowledge reported by CRU Y4 participants

		Frequency	Percent
Most strategies used (CRU Y4)	Ask my teachers to clarify	23	16.7%
	Ask others to help	23	16.7%
	Search the internet for the concepts	21	15.2%
	Read more about the concept	17	12.3%
	Watch educational videos	8	5.8%
	Do more practice to understand	7	5.1%
	Study hard to understand	4	2.9%
	Translate the concepts into Arabic	4	2.9%
	Use a dictionary	4	2.9%
	Memorise the concepts	3	2.2%
	Study examples to understand	3	2.2%
	Others	21	15.2%
	Total responses	**138**	**93.9%**
	No attempt	**9**	**6.1%**
	All possible answers	**147**	**100.0%**

4.1.4.2.3 Most Transformative Concepts Reported by CRU Y4 Participants

As for the responses to the question about the three most transformative concepts which CRU Y4 participants had experienced during their teacher education programme, the 49 participants reported a total of 125 responses out of 147 possible answers. Table 4.16 shows that the concept of *critical thinking* came in 1st place as the most transformative as expressed by 7 participants,

who represent 14.2% of the total participants and their responses comprise 5.6% of the total responses. It was closely followed by the concepts of *assessment* in 2nd place and *reflection* in 3rd place with 4% of the total responses as they were reported by 5 participants, who represent 10.2% of the total respondents. The concepts of *creativity* and *teaching methods* came in 4th and 5th places as each was mentioned by 4 participants, and this indicates 3.2% of the total responses. Three participants, whose responses represent 2.4% of the total responses, expressed the concepts of *classroom management*, *dealing with students*, *grammar translation method*, *high expectations*, *learning outcomes*, and *sociolinguistics* as transformative; accordingly, they were placed from 6th to 11th places respectively. As for the other concepts that were expressed by less than 3 participants, they received 82 responses comprising 65.6% of the total responses reported. Out of 147 possible answers, CRU Y4 participants provided 125 responses, which represent 85%. On the other hand, there were only 22 cases of no attempt, indicating 15% of the total number of possible answers. Compared to CRU Y1 participants' no attempt cases (n=51, 28.8%), there was a significant drop by 13.8% in the category of no attempt cases in CRU Y4. Nevertheless, the statistics show a large number of various concepts experienced as transformative by CRU Y4 student teachers.

Table 4.16 Most transformative educational concepts reported by CRU Y4 participants

		Responses		Participants
		N	%	%
Most Transformative Concepts (CRU Y4)	Critical Thinking	7	5.6%	14.2%
	Assessment	5	4%	10.2%
	Reflection	5	4%	10.2%
	Creativity	4	3.2%	8.1%
	Teaching Methods	4	3.2%	8.1%
	Classroom Management	3	2.4%	6.1%
	Dealing with Students	3	2.4%	6.1%
	Grammar Translation Method	3	2.4%	6.1%
	High Expectations	3	2.4%	6.1%
	Learning Outcomes	3	2.4%	6.1%
	Sociolinguistics	3	2.4%	6.1%
	Others	82	65.6%	-
	Total responses	**125**	**85%**	**-**
	No attempt	**22**	**15%**	**-**
	All possible answers	**147**	**100%**	**-**

4.1.4.2.4 Potential Threshold Concepts as Reported by CRU Y4 Students

The troublesome and transformative concepts generated from the data reported by CRU Y4 participants were compared and contrasted in order to establish an initial list of potential threshold concepts in the context of CRU Y4. Table 4.17 shows that the concepts of *teaching methods, critical thinking, assessment, classroom management,* and *reflection* were reported as both troublesome and

transformative. At the top of the initial list of potential threshold concepts in CRU Y4, the concept of *teaching methods* received 15 responses in total as being troublesome (11 responses) and troublesome (4 responses), and this makes it the most potential threshold concepts in CRU teacher education. It was followed by the concept of *critical thinking* in 2nd place with 12 responses in total, which was also found to be the most transformative concept as reported by CRU Y4 participants. The concept of *assessment* received a total of 9 responses placing it in 3rd place. In 4th and 5th places came the concepts of *classroom management* and *reflection* after receiving 8 responses. As for those transformative concepts which were not expressed as troublesome, *creativity* reached 6th place with a total of 4 responses, whereas *dealing with students, grammar translation method, high expectations, learning outcomes,* and *sociolinguistics* secured 7th to 11th places. On the other hand, the other troublesome concepts such as *validity*, *communicative ability, pragmatics, curriculum evaluation* and *error analysis* did not make it to the initial list of potential threshold concepts in CRU Y4 as they were not reported as transformative.

Table 4.17 Potential threshold concepts as reported by CRU Y4 participants

	Troublesome Concepts (CRU Y4)		**Transformative Concepts (CRU Y4)**		**Potential Threshold Concepts (CRU Y4)**
1	*teaching methods (11)	1	*critical thinking (7)	1	*teaching methods (15)
2	~~validity (6)~~	2	*assessment (5)	2	*critical thinking (12)
3	*classroom management (5)	3	*reflection (5)	3	*assessment (9)
4	~~communicative ability (5)~~	4	creativity (4)	4	*classroom management (8)
5	*critical thinking (5)	5	*teaching methods (4)	5	*reflection (8)
6	~~practicality (5)~~	6	*classroom management (3)	6	creativity (4)
7	*assessment (4)	7	dealing with students (3)	7	dealing with students (3)
8	~~pragmatics (4)~~	8	grammar translation method (3)	8	grammar translation method (3)
9	~~curriculum evaluation (3)~~	9	high expectations (3)	9	high expectations (3)
10	~~error analysis (3)~~	10	learning outcomes (3)	10	learning outcomes (3)
11	~~procedure (3)~~	11	sociolinguistics (3)	11	sociolinguistics (3)
12	~~rapport with students (3)~~				
13	*reflection (3)				
14	~~syntax (3)~~				

**Reported both as troublesome and transformative*

4.1.4.3 Potential Threshold Concepts as Reported by CRU Students

The two initial lists of potential threshold concepts generated from the data of CRU Y1 and CRU Y4 were compared and contrasted in order to establish a finalised list of potential threshold concepts in CRU teacher education programme. As seen in Table 4.18, it is interesting to note that none of the concepts appeared on both lists (transformative as well as troublesome). Therefore, the same list of transformative concepts derived from the CRU Y4 participants remained the same as the list of potential threshold concepts in CRU teacher education. At the top of the list were the educational concepts of *teaching methods, critical thinking, assessment, classroom management,* and

reflection. The list was completed with *creativity, dealing with students, grammar translation method, high expectations, learning outcomes*, and *sociolinguistics*. On the other hand, all the potential threshold concepts reported by CRU Y1 participants were excluded from the next phase as they were not reported transformative in CRU Y4.

Table 4.18 Potential threshold concepts at CRU

	Potential Threshold Concepts (CRU Y1)		Potential Threshold Concepts (CRU Y4)		**Potential Threshold Concepts at CRU**
1	~~phonetics (31)~~	1	teaching methods (15)	1	teaching methods (15)
2	~~academic reading (17)~~	2	critical thinking (12)	2	critical thinking (12)
3	~~linguistics (14)~~	3	assessment (9)	3	assessment (9)
4	~~academic writing (11)~~	4	classroom management (8)	4	classroom management (8)
5	~~IT (9)~~	5	reflection (8)	5	reflection (8)
6	~~phonology (9)~~	6	creativity (4)	6	creativity (4)
7	~~grammar (5)~~	7	dealing with students (3)	7	dealing with students (3)
8	~~globalisation (4)~~	8	grammar translation method (3)	8	grammar translation method (3)
9	~~different opinions (2)~~	9	high expectations (3)	9	high expectations (3)
10	~~self-confidence (2)~~	10	learning outcomes (3)	10	learning outcomes (3)
11	~~speaking (2)~~	11	sociolinguistics (3)	11	sociolinguistics (3)

4.1.5 Potential Threshold Concepts in Teacher Education

In order to arrive at a final list of potential threshold concepts in teacher education, the two finalised lists of potential threshold concepts generated from ASU and CRU were compared and contrasted. Table 4.19 shows that critical thinking, teaching methods, classroom management, and assessment are the only four educational concepts which were reported at both colleges. The concept of *critical thinking* was the most potential threshold concept receiving 26

responses. In addition, it was at the top of the ASU list with 14 responses and second on the CRU list with 12 responses. It was followed by the concept of *teaching methods*, which was also a very important concept at both ASU and CRU with a total of 23 responses. It also appeared in the top 3 on both the lists of ASU (third=8 responses) and CRU (first=15 responses). In 3rd place came the concept of *classroom management,* featuring in 16 responses in total. It was also reported in the top 4 on both the lists of ASU (second= 8 responses) and CRU (fourth= 8 responses). The concept of *assessment* made it to 4th place with a total of 14 responses after receiving 5 responses at ASU (6th place) and 9 responses at CRU (3rd place). On the other hand, the other concepts like *motivation* (ASU) and *reflection* (CRU) were disqualified and not investigated in the interview phase as they were not reported on both lists of ASU and CRU.

Table 4.19 Potential threshold concepts in teacher education

	Potential Threshold Concepts at ASU		**Potential Threshold Concepts at CRU**		**Potential Threshold Concepts in Teacher Education**
1	*critical thinking (14)	1	*teaching methods (15)	**1**	***critical thinking (26)**
2	*classroom management (8)	2	*critical thinking (12)	**2**	***teaching methods (23)**
3	*teaching methods (8)	3	*assessment (9)	**3**	***classroom management (16)**
4	behaviourism (6)	4	*classroom management (8)	**4**	***assessment (14)**
5	motivation (6)	5	reflection (8)		
6	*assessment (5)	6	creativity (4)		
7	communicative approach (5)	7	dealing with students (3)		
8	learner-centred approach (5)	8	grammar translation method (3)		
9	task-based approach (5)	9	high expectations (3)		
10	constructivism (4)	10	learning outcomes (3)		
11	individual differences (4)	11	sociolinguistics (3)		

**Reported at ASU and CRU*

The final list of potential threshold concepts in teacher education was sent via email to some instructors at the two colleges to confirm whether those four concepts are of the most important concepts in teacher education. Three CRU instructors confirmed that the four educational concepts are essential for student teachers to understand and acquire, whereas ASU instructors did not respond as they did not want to get involved in the research findings via personal communication.

It is interesting to see whether these four potential threshold concepts were reported both troublesome as well as transformative by the same participants. As seen in Table 4.20, the concept of *critical thinking* was reported both troublesome and transformative by 4 out of 26 participants. The concept of *Teaching methods* was mentioned as troublesome and transformative by 3 out of 23 participants. As for the concepts of *classroom management* and *assessment*, no more than 2 participants expressed these two concepts to be troublesome as well as transformative. Drawing on the findings, we can conclude that transformative concepts do not necessarily have to be troublesome concept as seen by learners. It appears that such a lack of strong correlation between the troublesome and transformative aspects of concepts, as the research findings show, does not support what Meyer and Land (2003; 2006) believe that a threshold concept is highly likely to be troublesome. However, some might argue that those four concepts could have been recorded troublesome by the participants who experienced them as transformative if the questionnaire asked for more than three options. This could be correct, but if there had been more than three options and those concepts had been recorded, they would have appeared not highly regarded as troublesome by students.

Table 4.20 Potential threshold concepts as reported troublesome and transformative by the same participants

Potential Threshold Concepts	Troublesome	Transformative	Troublesome and Transformative
critical thinking (26)	8	18	4
teaching methods (23)	15	8	3
classroom management (16)	8	8	2
assessment (14)	4	10	1

As for the reasons why ASU and CRU participants found critical thinking, teaching methods, classroom management, and assessment troublesome, the following section provides some answers.

4.1.6 Reasons of Troublesome Knowledge

In the questionnaire, the ASU and CRU participants were asked to give their reasons why they found the difficult educational concepts they had experienced troublesome. Only focussing on the potential threshold concepts identified in this research study, Table 4.21 shows some reasons why *critical thinking, teaching methods, classroom management,* and *assessment* were found troublesome drawing on the types of troublesome knowledge proposed by Perkins (2006). The concept of *critical thinking* was mainly reported as troublesome because it is alien and conceptually difficult. A participant wrote: *"I'm not used to analyse and think critically"*, whereas another recorded: "*It requires deep understanding".* In addition, it seems there is another type of troublesome knowledge related to the practical aspect of knowledge when a student wrote: *"It is too difficult to apply".* This type of troublesome knowledge cannot be categorised as alien, ritual, inert, conceptually difficult or tacit. As *for teaching methods*, the type of conceptually difficult is the common reason. For instance, a participant

recorded: *"It has multiple layers of complexity",* whereas another student wrote: *"I am confused by the different sub categories".* Similar to *critical thinking*, there is the troublesome type of being difficult to apply as recorded by a participant: *"It is too difficult to apply".* The reasons why *classroom management* was found troublesome are also the same. A participant described the concept as *"strange",* which can be categorised as alien. Being conceptually difficult, a student wrote: *"What is the real meaning of it: about students' level or control*". Like *critical thinking* and *teaching methods*, the practical difficulty was mentioned after a student wrote: "*The practical part is difficult*". As for *assessment*, all the reasons are related to the type of conceptually difficult knowledge. A participant recorded: *"It is similar to the concept evaluation*", whereas another wrote: *"It needs experienced teachers to explain"*.

Table 4.21 Reasons why critical thinking, teaching methods, classroom management, and assessment troublesome

Potential Threshold Concepts	Reasons	Types of Troublesome Knowledge (based on Perkins 2006)
Critical Thinking	It requires deep understanding	Conceptually difficult
	Learning something new	Alien
	*It is too difficult to apply	(new type)
	I am not used to analyse and think critically	Alien
	The concept is vague	Conceptually difficult
Teaching Methods	It has multiple layers of complexity	Conceptually difficult
	*It is too difficult to apply	(new type)
	I am confused by the different sub categories	Conceptually difficult
	Too many methods to analyse	Conceptually difficult
	It needs lots of thinking to choose the best methods	Conceptually difficult
Classroom Management	There are many things to think about	Conceptually difficult
	*The practical part is difficult	(new type)
	Concept sounds strange	Alien
	It is not explained well	Conceptually difficult
	What is the real meaning of it, about students' level or control	Conceptually difficult
Assessment	It is similar to the concept evaluation	Conceptually difficult
	It has different meanings	Conceptually difficult
	It needs experienced teachers to explain	Conceptually difficult
	It contains many concepts	Conceptually difficult

It seems that the types of troublesome knowledge being alien and conceptually difficult are the most prevalent ones. On the other hand, there is a new type of troublesome knowledge that is related to the practical aspect of applying

knowledge. Nevertheless, participants used different strategies to overcome these potential threshold concepts as well as other educational concepts. The next section presents the most common strategies used by ASU and CRU participants.

4.1.7 Strategies used to Overcome Difficult Concepts

As shown in Table 4.22, the strategies of *Ask others to help, Ask my teachers to help, Read more about the concepts, Search the internet for the concepts* and *Watch educational videos* are the most common strategies student teachers at both ASU and CRU used when they faced difficulty in understanding concepts. It can be seen that that many students still depend on more experienced people (friends, senior students, family members (others) and/or instructors). It can be inferred that student teachers at both colleges have good relationships with their instructors as they find it easy to communicate their learning difficulty to them. On the other hand, depending on other people may prevent student teachers from trying out more advanced learning strategies such as mind mapping, use concepts in context and relate concepts to real life experiences, which were mentioned by a very few participants. The strategy of *Read more about the concepts* is still preferred by many participants as a strategy for understanding difficult concepts. As technology is improving our lives, many participants prefer using the strategies of *Search the internet for the concepts* and *Watch educational videos*, mainly YouTube.

Table 4.22 Strategies used to cross liminal space

	Strategies use to cross liminal space	**Total Responses of Y1 and Y4 at ASU and CRU**
1	Ask others to help	81
2	Ask my teachers to help	80
3	Read more about the concepts	75
4	Search the internet for the concepts	53
5	Watch educational videos	46

Despite using many strategies in order to overcome troublesome knowledge, there were many cases of no attempt when participants were asked to provide answers about troublesome concepts, strategies used and transformative concepts, which were presented separately theme-wise and college-wise in details in the previous sections. Yet, it is thought it would be interesting to present the no attempt cases across the four study groups (ASU Y1, ASU Y4, CRU Y1 and CRU Y4).

4.1.8 No Attempt Cases of Troublesome, Strategies and Transformative

Figure 4.2 shows the cases of no attempt when participants at ASU and CRU were asked to provide answers to the questions about troublesome, strategies and transformative. As can be seen, compared to ASU Y4 and CRU Y4 respondents, ASU Y1 and CRU Y1 participants showed more cases of no attempt in troublesome, strategies, and transformative except the case of CRU Y1 participants in the category of strategies. ASU Y1 participants recorded the highest percentages of no attempt cases in the three categories: 36.6% in troublesome, 27.5% in strategies and 42.5% in transformative. They were followed by CRU Y1 participants who showed 29.9% of no attempt cases in

troublesome and 28.8% in transformative. On other hand, all the ASU Y4 and CRU Y4 participants showed no attempt cases below 20% in the three categories.

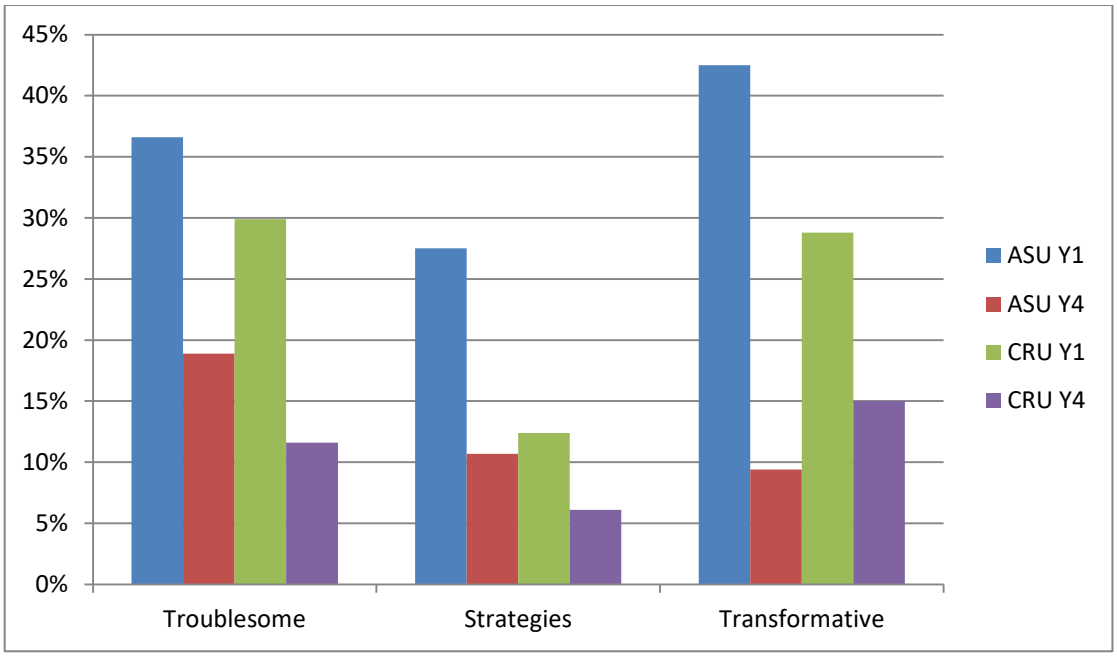

Figure 4.2 No attempt cases of troublesome, strategies and transformative at ASU and CRU

What can be inferred is that many Y1 student teachers at both colleges were struggling when encountering difficult concepts, which probably affected them experiencing transformational learning. It can be argued that those Y1 student teachers who found it difficult to identify troublesome concepts are stuck in the liminal space, especially the ones at ASU. In contrast, the majority of Y4 student teachers at both ASU and CRU are more confident in identifying troublesome knowledge, using strategies to overcome difficulty and experiencing transformational learning.

4.1.9 Summary of the Findings

To summarise the analysis of the quantitative data, a questionnaire was distributed to 212 ELT Y1 and Y4 student teachers in two academic institutions in Oman for the purpose of identifying threshold concepts in teacher education. The aim was to investigate their awareness of the characteristics of threshold concepts in general and their learning experiences with troublesome and transformative concepts. Participants in both institutions showed a relatively high level of awareness of the characteristics of threshold concepts, except for troublesome characteristics (slightly high). However, when it came to reporting example of troublesome and transformative concepts, there were huge differences between Y1 and Y4 participants at both colleges. Another important point to make is that there was a wide range of concepts reported by Y1 and Y4 participants as troublesome and transformative. After comparing the concepts obtained from Y1 and Y4 participants at both colleges, a final list of potential threshold concepts was concluded which includes critical thinking, teaching methods, classroom management, and assessment. These concepts were further investigated in Y4 student teachers' narratives in the interview sessions.

The next part presents the findings of the qualitative part of this research study and how they were analysed.

CHAPTER 4: DATA ANALYSIS:

PART 2: Data Analysis and Findings of the Interviews

4.2 Introduction to Qualitative Data

This chapter (part 2) describes the analysis and findings of qualitative data obtained from the interviews. The following sections report the analysis and findings of 20 interviews with Y4 student teachers, which were carried out at ASU and CRU. The purpose of this analysis was to confirm whether the final list of potential threshold concepts generated from the quantitative analysis, which includes critical thinking, teaching methods, classroom management, and assessment are threshold concepts in teacher education.

4.2.1 Analysis of Qualitative Data: Interviews

The findings of the open-ended items on the questionnaire obtained at two different colleges suggest that critical thinking, teaching methods, classroom management and assessment are likely to be considered threshold concepts in teacher education. Before reporting conclusively these concepts as threshold concepts, it was considered essential to have a more in-depth investigation. It was decided to explore themes qualitatively in students' accounts through semi-structured interviews in order to identify any characteristics of threshold concepts especially the features of troublesome, transformative, integrative, irreversible and discursive. As discussed in the research methodology chapter, the interviews could provide more insightful data about the epistemological and ontological effects of these educational concepts on student teachers in their journey to develop an initial teacher identity.

Moreover, individual interviews could provide more authentic responses as participants share their experiences, concerns and beliefs when encouraged by the interviewer.

Twenty semi-structured interviews with Y4 student teachers at the two colleges (ASU and CRU) were conducted. Participants were asked to share their experiences of educational concepts they had studied (See Appendix D for interview questions and protocol). Some of the most important points discussed in the interviews were:

1. The reasons why they want to become teachers
2. The characteristics of a good teacher according to their opinion
3. The knowledge they need in order to become teachers
4. Troublesome concepts they faced
5. Transformative concepts they experienced
6. What makes them as teachers different from other people (*this point was added from interview 3 onward).

The interviews were carried out immediately after the sessions of questionnaire data collection. This means participants were not given the final list of potential threshold concepts; therefore, their accounts were not influenced by the researcher. The following section reports on the theme of critical thinking as expressed by Y4 student teachers in the interviews.

4.2.2 Critical Thinking as a Potential Threshold Concept in Teacher Education

This investigation of identifying threshold concepts in teacher education in Oman has revealed that the concept of critical thinking is the most important educational concept as perceived by student teachers at two different colleges. It was explicitly reported as transformative as well as troublesome amongst Y4 students as well as Y1 students. The following sections present Y4 student teachers' narratives on the concept of critical thinking and how they saw it as

troublesome and transformative. Next, section 4.2.2.3 considers whether critical thinking could also have the characteristics of being integrative, irreversible and discursive.

4.2.2.1 Critical Thinking as Troublesome Knowledge

Huda (interviewee 8, female 5, CRU 1), acknowledged that critical thinking is troublesome. In the beginning, she found it vague and too difficult to grasp even though she had memorised it only as a definition when she had been at school. For Huda, critical thinking turned out to be more than just a definition when she started her teacher education programme. It became an integral part of her study as tasks and assignments required her to be critical. Because of that, she found it quite difficult and challenging to be critical and look at knowledge in a different way; not to memorise or take it for granted but as a means of improving her understanding. It can be argued that Huda went through the liminal space for trying to understand critical thinking where she got 'stuck' as the concept was vague. However, she did not remain 'stuck' long as she made a considerable effort to overcome the difficulty of critical thinking and cross the liminal space. She has even become self-critical and she gave an example of what she would do if something went wrong in classroom. Instead of ignoring it, she would ask herself *why* it went wrong and *how* she could improve it. The *why* and *how* questions that she learned from critical thinking are a sign of a powerful, epistemological shift in her ways of thinking about knowledge which is discussed more in section 4.2.2.2.

> Huda: Er, to be honest, er we heard about critical thinking in schools. It was only definition and we, we need to memorise that definition and that's it. When I came, like, to the college … everything here is, is, er

depend like, everything here depends on critical thinking. Er so, my research project is based on critical, er like in well …doing discourse analysis, we've got something about critical thinking. It's all about critical thinking. Then I, I went back = even when we do reflection about ourselves and our teaching, we need to be critical. So, it was, it was … [3]*yaani* kind of vague for me; what, what do they mean by critical thinking? So, I went on exploring how to be a critical thinker, and then I decided to, like, think, like, having the question where it's always in mind; how and why, why and why, why and how. So … in my classroom something went not really well, I ask myself why, how can I improve it?

([3]*yaani* = it means)

(Huda, interviewee 8, Female 5, CRU1)

Iyad (interviewee 9, male 4, CRU 2), experienced critical thinking as a troublesome concept. Though he did not elaborate on why he found it difficult, he associated the concept with reflection. To him, both the concepts of critical thinking and reflection are closely linked and treated as a two-step cognitive process: to reflect and to think critically. He found it difficult to reflect on students' micro teaching and be critical when evaluating their performances in terms of mistakes and weaknesses. Although he kept using reflection to justify his response, it can also be understood that he meant being critical (to be able to find mistakes and weaknesses) was difficult.

Researcher: Okay good. Now … so you've studied many, many different concepts related to education. So amongst these concepts, have there been any specific ones which have been particularly difficult that you really struggled with and found extremely hard to understand?

Iyad: Yeah.

Researcher: Which ones were they?

(….)

Iyad: Another concept that is er reflection and critical thinking … how -
Researcher: -how come-
Iyad: how to be er … how to reflect on your students and … (2-second pause) and how you can re … reflect on yourself … (2-second pause) and for example, it's related to our teaching when someone teach er … do his micro teaching I should reflect on him, his micro teaching. It's so difficult to …so difficult to find the mistakes or weaknesses that he … he did in his micro teaching. So you can learn from your … reflection for others and reflection on yourself.

(Iyad, Interviewee 9, Male 4, CRU 2)

Jalal, (interview 10, male 5, CRU 10), expressed that critical thinking was a troublesome concept he faced in his studies. It was not easy for him to be critical of his students' responses in the practicum sessions. He was unable to use critical thinking as a higher level of thinking to judge whether students' words or actions were wrong or not. Obviously, Jalal was still 'stuck' in the liminal space of critical thinking in this regard. Therefore, it can be argued that Jalal is concerned about his inability to be as critical as he is supposed to be as a teacher in class. Consequently, this may have a negative effect on his students in terms of thinking whether what they say is right or wrong. According to him, being critical helps teachers guide students morally to think about their words and actions. Jalal is 'stuck' in the liminal space of understanding critical thinking and still struggles a lot, so he thinks engaging with people who are experienced in critical thinking and watching videos on critical thinking could help him improve as a critical practitioner.

Researcher: So still some concepts … difficult to understand?
(2-second pause)
Jalal: Yeah.

Researcher: Okay, what are they?

Jalal: To be critical. Yes er it's difficult to … to be critical person. Yes, because er … sometimes students, one may say something wrong and you don't know that it was wrong, so you just don't know what to say. And it was = he was in a wrong position or rank or he's saying wrong things, so you don't know how to … respond to him.

Researcher: Okay, you mentioned, you know, critical … thinking.

Jalal: Mm.

Researcher: So it's difficult for you, it's still difficult for you, is it?

Jalal: Yes.

Researcher: So how, how, how will you try to understand that concept?

Jalal: Er maybe sit with people who have, who have critical thinking. … Er maybe … watch videos about critical thinking, how to … use critical thinking, and … (2-second pause) that's.

(Jalal, interviewee 10, Male 5, CRU3)

Kamil (interviewee 11, male 6, CRU 4) experienced critical thinking as troublesome as well as transformative. When asked why he found critical thinking a difficult concept, he pointed out that he had no problem with the definition of the concept, but his problem appeared to be with understanding the concept as a teacher in the context of teacher education. He struggled with grasping the actual meaning of critical thinking which could be interpreted as a difficulty in how to apply it to students in the classroom. Interestingly, it seems, according to Kamil, there is a distinction between the decontextualised definition of critical thinking (easy to understand) and the meaning of critical thinking in the context of being a teacher (difficult to grasp). This indicates that critical thinking in the context of being a teacher is more complex and involves more understanding.

Researcher: Okay, and what about the second difficult concept you mentioned? I think it was … -

Kamil: - Critical thinking.

Researcher: Er okay. It's critical thinking. Why –

Kamil: - Critical thinking –

Researcher: Why was it difficult?

Kamil: Actually it's er …I understand the literal meaning of er … -

Researcher: - Critical thinking –

Kamil: Critical thinking … but er … I don't know what this actually means.

(Kamil, Interviewee 11, Male 6, CRU 4)

Kamil is still struggling with grasping the meaning of critical thinking in context. When he was asked about other educational concepts he still finds too difficult to understand, he emphasised that critical thinking is still a troublesome concept he is going to face when he starts his career. Kamil seems to be 'stuck' in the liminal space of critical thinking. He showed concerns that even if he continues to study his MA degree, critical thinking will be a major issue he should deal with. However, Kamil raised a very interesting point when he pointed out that we actually learn when we are faced with difficult concepts.

Researcher: Okay. Question 8. So you're about to graduate … to become a teacher and you go to school. So are there still any educational concepts you find them too difficult to understand?

(2-second pause)

Kamil: As far as I know, I think er … (2-second pause) no, but er education is not er end with the … this … when I, when I finish er my studying here. Actually I plan to … (2-second pause) complete my study … -

Researcher: - All right, do you mean like … MA?

Kamil: Yes, MA … and er … I think there is, sure will be er a new concept that I will not understand it. That's how we … can learn.

Researcher: Can you … think about that new concept that you will not understand? I mean, do you have … any particular concepts now?

Kamil: Now for example er … (6-second pause) let's go back to critical thinking … -

Researcher: - So still –

Kamil: - Yes –

Researcher: - That means +critical thinking+ –

Kamil: - +Yes, that's not+ er clear. This, the idea of critical thinking, it's not clear in my mind yet.

(Kamil, Interviewee 11, Male 6, CRU 4)

Despite being 'stuck' in the liminality of critical thinking, Kamil seems positive about overcoming the difficulty of critical thinking. He uses many strategies in order to understand difficult concepts. What is interesting about Kamil's strategies is that he first identifies where the problem is. Such an awareness of the reasons that cause difficulty in understanding concepts gives him confidence about understanding difficult concepts eventually.

Researcher: Okay … okay so … you've talked about, you know, why those concepts, you know, were difficult. So, did you give up?

Kamil: No, never.

Researcher: So, what strategies did you use to overcome these difficulties and understand these concepts?

Kamil: Er actually first er … I understand er where is the problem with er with this er concept, then I try to … avoid them, avoid them and er … search about them, read more about them, ask teachers er … -

Researcher: - Okay -

Kamil: Also ask students who already finished this course –

Researcher: - All right-

Kamil: - who already know about these concepts and so on.

(Kamil, Interviewee 11, Male 6, CRU 4)

Omaima (interviewee 15, female 6, CRU 8) experienced some difficulty in understanding critical thinking when it was introduced in class. According to her, it was not only her who faced difficulty in understanding critical thinking, but many students felt the same. In the beginning, it was difficult for her to be critical when answering her instructor's questions. From the way she used the phrases "The teacher keeps asking us some question", "she was waiting for something critical" and "we keep saying, teacher what do you mean by critical again and again", it can be interpreted that Omaima and many students got 'stuck' in the liminal state of being unable to be critical for a long period of time. As her instructor was not accepting answers which were not the result of critical thinking, Omaima and her classmates were challenged and probably motivated to keep asking their instructor to help them understand the concept. It was a strategy used to help them cross the liminal space of critical thinking as a troublesome knowledge.

> Omaima: Another one is er critical thinking. The teacher keeps always asking us some questions and our answers would be not acceptable to her because she was waiting for something critical and different. I remember that at class we keep saying, teacher what do you mean by critical again and again. And then she gave us example. After that, the students keep, like, starting answering and understanding that concept.
>
> **(Omaima, Interviewee 15, Female 6, CRU 8)**

4.2.2.2 Critical Thinking as Transformative

Dalal (interviewee 4, female 4, ASU 4) experienced some ontological shift with the concept of critical thinking even though she did not say it directly. When she was asked what made her different as a teacher from other people, she

mentioned the way teachers think as a unique characteristic that makes teachers different from others. Though she did not mention the concept of critical thinking per se, it can be inferred that she meant critical thinking since she differentiated teachers' ways of thinking from other people's ways of thinking. Dalal pointed out that teacher's thinking goes beyond the context of teaching to the context of life outside the classroom. She gave an example of raising children and how teachers as parents could think of other better ways to discipline their own children instead of punishing them. She also expressed that the way a teacher thinks is not arbitrary, but it depends on a systematic way based on theories the teacher has studied. She believes that critical thinking makes teachers unique from others as they look at things differently.

Researcher: What makes a teacher different from another person?

(2-second pause)

Dalal: What makes a teacher different from another person? I think it's the way of his thinking. Because, like, his or her thinking, the teachers they have their own unique thinking because thinking itself, like, will differ, will be affected by the things that you have been raised on from your own college or what you have been seeing, and practising in the school itself will be reflected on your own thinking, on your own way of, like, raising your own children, for example. You will start, like, no this is not a good way for example punishing er my son, my daughter. No, I will take that from a theory I have studied and so on. So the thinking will depend on the ways that you will = that the different ways you got to, to know and so on. So the thinking of teachers is what makes them unique, their ways of seeing the world is different.

(Dalal, Interviewee 4, Female 4 ASU4)

Huda (interviewee 8, female 5, CRU1) also experienced an ontologically transformative change in her ways of thinking about herself and the world after she understood the concept of critical thinking. She stated that critical thinking helps her understand and improve herself as a person who can see the world in a different way. Her perception of the issues happening in the world is not influenced by what is being told in the media, for example. She creates her own understanding by looking into the reasons that cause issues and accordingly judges whether those issues could be justified as good or bad.

> Huda: So, so from that I can, like, now I can … er repeat these questions in my mind. So I trained myself to be like a bit critical thinker. Er and this can help, help me to understand myself … help me, like, how to improve myself and how can I perceive the world. Er also, it can help me, like, like to think of, like, issues that are happening in the world, whether they're good, bad; what makes them good, what makes bad.
>
> **(Huda, Interviewee 8, Female 5, CRU1)**

Huda values herself as a critical thinker as it helps her create an initial teacher identity. She feels she is a teacher because, according to her, critical thinking helps her understand her students (in practicum sessions), which is a characteristic of a good teacher as she pointed out earlier in the interview. She uses critical thinking to identify and solve the problems her students are having (in practicum sessions). Furthermore, she thinks critically when she selects teaching materials in order to make sure they are suitable for the level and interests of her students. For Huda, critical thinking is a very powerful concept that has an epistemological and ontological impact on her as a person and teacher. It shapes the way she thinks about becoming a better person as well as

a better teacher. Through her constant engagement with critical thinking, Huda has reached the subliminal mode of the liminal space of critical thinking as it has become part of her ways of thinking and practising.

> Researcher: That's very interesting. Okay my final question … (2-second pause). Do you feel that the educational concepts which have great influence on you … have helped acquire some qualities … of being a teacher?
>
> (….)
>
> Huda: Okay. First I mentioned that, that a good teacher is a teacher who understands his or her student. Er then I said one of the concepts is critical thinking. So, whenever I think of the problems that are facing my students, I'm using critical thinking … er concept. So, based on that, er, like, I have the ability to understand my students and give them more, and to design everything related, like, based on their level, their interests, etc.
>
> **(Huda, Interviewee 8, Female 5, CRU1)**

Iyad (interviewee 9, male 4, CRU 2) also experienced some transformative change when he understood critical thinking. When asked about how the educational concepts he mentioned as having a huge impact on him had helped him to acquire some qualities of becoming a teacher, he pointed out that critical thinking helps him think better. Before joining the college to become a teacher, he had some difficulty in looking at things critically as critical thinking was not probably introduced in the school curriculum or practised during the class. Alternatively, critical thinking could have been introduced in the school curriculum, but Iyad did not see and value or experience any epistemological or ontological change at that time. As clearly stated by Iyad in the interview, critical

thinking has meaning for him as a teacher. He is now more able to think critically after he improved his critical thinking.

> Researcher: Okay good, good to hear that. Okay another question. So do you feel that the educational concepts which had great influence on you have helped you acquire some qualities of being a teacher? If yes, could you give me some examples?
>
> Iyad: (…) And er critical thinking. As for me as a teacher, I improved my critical thinking and … and now I am … I can think more better … better than … than the past I did. … That's it –

(Iyad, interviewee 9, Male 4 CRU 9)

Though Jalal (interviewee 10, male 5, CRU 3) found it difficult to be critical, he acknowledged the importance of critical thinking in changing the way he sees himself in a different way. He felt more confident to participate in classroom discussions at college where he could identify strengths and weaknesses of his classmates' presentations.

> Researcher: - Okay, is there another dif= another concept that has changed the way you think, the way you see yourself?
>
> Jalal: Mmm … (2-second pause) critical thinking maybe. … +to be critical+ -
>
> Researcher: - +Okay, good+, in what way?
>
> Jalal: Er … (2-second pause) (inaudible) when others speaking or doing a presentation or doing … like er …a conversation or discussion, yes, I can er … mention them the wrongs and the rights.

(Jalal, interviewee 10, Male 5, CRU 3)

What Jalal said in the previous account does not contradict his earlier statement about finding it difficult to think critically as a teacher. It seems he separated himself as a college student who can be critical with his peers (he

used the word *others*) and as a teacher who finds it difficult to be critical with his students (he used the word *students*). Arguably, Jalal understands critical thinking on two levels. The first level is to be critical, but without waiting for other people to experience any change as in the case of being critical with his peers. The second level is to be critical with having influence on changing people's ways of thinking and behaviours. The latter was what made Jalal find it difficult to be critical and having influence on students' ways of thinking. In response to the question of what made him as a teacher different from others, he mentioned his ability to change how students think, but he was not decisive as he used the word *maybe*.

> Jalal: Mmm .... (3-second pause) The way they are thinking.
> Researcher: Okay.
> Jalal: Yeah. Er Maybe I will be able to change the way, the way of thinking.
>
> **(Jalal, interviewee 10, Male 5, CRU 3)**

Clearly, Jalal has yet to experience a powerful epistemological as well as ontological shift through critical thinking. There are a few traces in his accounts that show some epistemological change as he has become able to use the knowledge of critical thinking to critique people's work. However, when it comes to having influence on others with his critical thinking skills, he seems uncertain of achieving that. There is no doubt that Jalal is aware of the importance of understanding fully the concept of critical thinking, and that is why he plans to improve his critical thinking.

Although Kamil (interviewee 11, male 6, CRU 4) perceived critical thinking as troublesome knowledge, he mentioned some epistemological and ontological

change he had experienced from critical thinking when he was asked about a concept that had changed his life. He was aware of the difficulty in fully grasping the concept of critical thinking in the context of being a teacher, and also aware of the transformative change he was experiencing from being critical.

> Researcher: Okay. Could you think of a third … concept that has changed your life?
> (2-second pause)
> Kamil: Er … (2-second pause) critical thinking ... again.
> (Both laughing)
> Researcher: Okay. So critical thinking seems … the most –
> Kamil: - Yes -
> Researcher: - important concept for you.
> Kamil: Yes.
> Researcher: It was difficult but also it is very helpful for you, yeah?
> Kamil: Yes.
>
> **(Kamil, Interviewee 11, Male 6, CRU 4)**

When he was asked about how critical thinking had changed his life, Kamil reported that he had become able to understand how people think. Because of that, he could 'criticise' what people say or do. This new view of the knowledge of critical thinking took Kamil from the micro context of the classroom to the macro context of society and life outside school. He was positioning his status as a person who possesses critical thinking; accordingly, he became able to understand and criticise how others think. In an attempt to find out whether Kamil was not contradicting himself when he reported critical thinking as a difficult concept he has yet to understand, the researcher asked him if he criticised people in a good or bad way. Kamil made it clear that he uses critical thinking in a negative way. This clearly shows that he has not fully grasped the

concept of critical thinking. Alternatively, it could be interpreted that Kamil probably meant to say that being a critical thinker means he should evaluate both the good and negative aspects (with more focus on the negative part) of what people believe, say and do.

Kamil: It's er … actually I learn from critical thinking that's … how I can er understand and criticise er people and the way they think and er –
Researcher: - In a good way or bad way?
Kamil: I think it's both … or maybe in a bad way.
Researcher: You criticise people in a bad way? In a negative way?
Kamil: Yes.
Researcher: Or in a positive way?

(Kamil, Interviewee 11, Male 6, CRU 4)

In the context of teaching, Kamil was, however, aware that critical thinking should be used with students in a positive way. He connected critical thinking to communicating with students in a positive way and with motivating students to learn. He justified his point by stating that his students are still children and they will get emotionally hurt if they are criticised in a bad way. Consequently, Kamil believes that "students will hate learning''. As for adults, Kamil pointed out it is the case with his friends that they are mature enough to understand and accept his point even if he uses critical thinking in a negative way.

Kamil: No, for my students it's er has to be in a positive way –
Researcher: - Okay –
Kamil: - to motivate them and er make them er … more interested in er learning.
Researcher: So what about people outside? If you use critical thinking outside the classroom, so will you use it in a negative way or a positive way?

Kamil: With my friends I think I will use it both because they will understand my point, my point. They are er adults. They are er … not like my students are, they are children. Maybe I will = my students are still children. Maybe I will … for example break their feelings and they will hate … learning.

(Kamil, Interviewee 11, Male 6, CRU 4)

The theme of critical thinking and ways of thinking also occurred in Kamil's account when he was asked if he felt that he was a teacher and what made him different from others. He responded that since he is going to be a teacher, he has to change the way he thinks. Furthermore, he stated that the way he thinks is what makes him, as a teacher, different from others. It can be argued that Kamil did not mean normal thinking as all people think but rather critical thinking, which is a higher cognitive skill that should be practised and learned.

Researcher: So you feel now … you've become a teacher?
Kamil: Yes.
Researcher: Could you give me some examples?
Kamil: Of educational concepts?
Researcher: Yeah, I mean you feel that you are a teacher now. You have the qualities of a teacher.
Kamil: Er … I think I change the way that I think … when I er realise that … I'm … I will be a teacher, so I will … I'll be more respectful … for the people … and I … realise that er I will be a teacher, so I have to be … I will = I have to change the way that I think … and er … try to help.
(….)
Researcher: What makes you different from other people outside?
Kamil: Other people … (3-second pause) er … maybe that er … in the way that I think, in the way that I see the people and er … offer assistance for people that what I learn … from the course that I have.

(Kamil, Interviewee 11, Male 6, CRU 4)

It is interesting to note that when Kamil was asked about the reasons why he wanted to become a teacher at the beginning of the interview, Kamil made it clear that he had a teaching purpose which is to change the way people think. Even though he did not mention critical thinking per se, it could be assumed he meant critical thinking since it is a recurring theme in his account as the interview progressed to the educational concepts. His father, being a teacher himself, was the first influence for Kamil to become a teacher, but when he joined the college, he went through a self-realisation of his teaching purpose.

> Researcher: Thank you for coming. Er the purpose of this research is to ask you about some educational concepts. My first question is, why do you want to be a teacher?
>
> Kamil: Actually er at the beginning, because er my father is a teacher. But er when I started here at the college, I realised that er it's not about er it's not just about my father is a teacher. Actually I like er … the job of teaching and er how I can er … make er change people and change the way they think.

(Kamil, Interviewee 11, Male 6, CRU 4)

Throughout the interview, Kamil was quite concerned about critical thinking and the ways of thinking. He started the interview by stating that his purpose in teaching is to change how people think, and he finished it with a similar theme which is to change the way he thinks. When he was asked if he felt he was a teacher and what made him different from other people, he responded with the same phrase 'the way that I think'. Interestingly, Kamil was aware that before helping people change the way they think, he should first change the way he thinks. In spite of his struggle with it, critical thinking plays an important role in Kamil's professional as well as personal life.

Another interviewee, Laith (Interviewee 12, male 7, CRU 5) experienced critical thinking as a transformative concept. When he was asked about a concept that changed the way he thinks, Laith mentioned the way of thinking which turned out to be critical thinking. His thinking shifted from accepting what he sees and reads into evaluating how things happen and how to do things in different ways.

> Researcher: Okay, any other concept that that has changed … the way you think?
> Laith: Er the way er of thinking itself, the way of thinking itself, it's changed. For example, er -
> Researcher: - So do you mean … critical thinking?
> Laith: Yes, critical thinking, how to do this, how to do that, how this happened and how this grows, you know, all of these things.

(Laith, Interviewee 12, Male 7, CRU 5)

To Laith, critical thinking seemed to be like a tool he used to save face, as a teacher, when he encountered difficult questions outside the classroom. He gave an example of being asked about something he did not know. Instead of providing no answer, which is probably unacceptable to Laith as a teacher, he used his critical thinking to access other concepts he already had and see how he could provide an answer that showed he knew some knowledge about the new idea.

> Researcher: How would critical thinking, you know, help you as a person … to improve … your, your personality outside the classroom?
> Laith: Yes, +for example+
> Researcher: +How+?
> Laith: if somehow = if someone, sorry, if someone asks you about something … that … it's new for you, you will start over like er generalising your concepts you have already in your, like, in your knowledge … to that person. And also you will start like covering

your, I mean, the, the language you have because you don't have the, I mean, the knowledge that, the, that person asks about it. So you start covering that. You are showing that you have it but … you don't have it. But at least, you have some knowledge about it. This is really good thing to know.

Researcher: And also you need to … -

Laith: - Yeah think more and in really creative way to, like, illustrate your … I mean, your meaning and all of these things.

(Laith, Interviewee 12, Male 7, CRU 5)

What has been discussed above is supported by an earlier point made by Laith when he was asked what knowledge he needs to acquire in order to become a teacher. He put much emphasis on acquiring English language knowledge. The way he emphasised the importance of knowing so many things related to the English language such as its grammatical structure, literature and history indicates that Laith sees the English teacher as the master of providing knowledge. It can also be assumed that in his world of being an English teacher, there is no room for saying (I don't know). So, he uses critical thinking as a means of saving him from positions where he cannot provide answers.

Laith: Yeah, I think the knowledge that I have to have it on my mind … everything related to the subject … in terms of, I mean, the structure of the subject … the literature of the subject also, not only the structure. So we have, I mean, I have to have all these kinds of knowledge. So not only the, I mean, … the written form of the language, you know. Also we have to know the literature of the language, history of the language … and all of these things related … to the English language.

(Laith, Interviewee 12, Male 7, CRU 5)

In Laith's case, critical thinking does not have a powerful epistemological and ontological shift in his ways of thinking and practising compared to the previous interviewees. Instead, it is one of his face-saving actions.

Tahani (interviewee 20, female 9, ASU 10) experienced a substantial epistemological and ontological impact in terms of critical thinking on herself as a teacher and as a person. One of her reasons for becoming a teacher was to make changes in the world through teaching students. To achieve her goal, critical thinking helped her to see the current situation in the Omani school system as well as in the country of Oman as a whole. It can be inferred from her account that she was not happy with the learning experience students receive at schools which could negatively affect the development of her country. Although the researcher missed the opportunity of asking Tahani to elaborate on the changes she wanted to make and how she could do that, it can be argued that she was talking about teaching her students how to be critical thinkers. If her students could think critically, they would be able to see things in a critical way and provide solutions to make positive changes in their school, city and country instead of accepting the situation as it is. Linking the ability to be critical to making changes, she believes that critical thinking would enable her to think of ideas and solutions through which she could achieve her purpose of making changes in schools and her country.

> Researcher: (…) So let me now ask you about some examples of how these three concepts being professional, … critical thinking and delegation … let's say have helped you see the world in a different way, see yourself in a different way?
> (2-second pause)
> Researcher: Give me some examples, please.

Tahani: As I told you that I have chosen this er this job in order to do some changes in the world.

Researcher: Yes.

Tahani: And in in order to do these changes, we need critical thinking … and actually er it helps er me to, to think critically about the sit = the real situations in our schools and in our country, and come up with some er solutions and some er thoughts that I have to achieve when I will be a teacher.

(Tahani, Interviewee 20, Female 9, ASU 10)

Once again, Tahani emphasised the importance of critical thinking in her life as a teacher when she was asked to provide an answer to the question about how critical thinking helped her acquire some qualities of being a teacher. She linked critical thinking to increasing her knowledge by stating that having critical thinking will enable her to do research in order to find the best answers to those pedagogical issues she thinks about critically. As a result, she will be able to expand her knowledge which will shape her personality as a teacher. This epistemologically transformative learning obtained from critical thinking on knowledge plays a vital part in Tahani's career as a teacher.

Researcher: Again, being professional, being critical or critical thinking and delegation, how did they help you … to get some … qualities of being a teacher?

Tahani: Er do you mean that er how they helped to me to shape my personality as a teacher?

Researcher: Yes, yeah, of course.

Tahani: Er … because er when I er think critically er it (inaudible) me to, to have some research and that will broaden my knowledge and that actually will help me in my teaching er in my teaching life.

(Tahani, Interviewee 20, Female 9, ASU 10)

When she was asked about how being a teacher makes her different from other people, Tahani pointed out that she has a different view of looking at world issues. Though she spoke in general and did not mention critical thinking, it can be argued here that showing concerns about world issues does not come from a person who does not think critically. Such a concern requires a person who uses their mind to see what is good or bad in our world and looks at things in a critical way. Therefore, this ontological view of herself as part of this world could be due to the fact that she had experienced transformative effects from using critical thinking.

> Researcher: Good, yeah. Okay, so since you've said that … you've , you've got some qualities of being a teacher. Now my, my final question is, as being a teacher, what makes you different from other people?
>
> (…)
>
> Tahani: Yes I think that now er I'll be more concerned about things that is = that are happening in this life. It gives me er this different er way of looking at, at the er things that is around = that are around us.

(Tahani, Interviewee 20, Female 9, ASU 10)

4.2.2.3 Critical Thinking as Integrative, Irreversible and Discursive

As reported and experienced by Y4 student teachers, the integrative aspect of the concept of critical thinking is undeniable. There was no direct question in the interview asking about the extent to which the participants considered critical thinking to be integrative. However, there is some evidence suggesting critical thinking unlocks or at least is accompanied by other concepts, especially reflection and creativity, as these excerpts from the following interviewees show:

Huda (interviewee 8, female 5, CRU 1), “Then I, I went back = even when we do reflection about ourselves and our teaching, we need to be critical”.

Iyad (interviewee 9, male 4, CRU 2), “Another concept that is er reflection and critical thinking’’.

Laith (interviewee 12, male 7, CRU 5), “Yeah think more and in really creative way to, like, illustrate your … I mean, your meaning and all of these things’’.

In terms of being irreversible, most of the participants who mentioned critical thinking were able to discuss the concept within its context. A few of them used the terms *thinking* or *way of thinking,* but it could be easily inferred that they meant or were discussing critical thinking.

All of the interviewees were able to show their concerns and express their ideas using educational terms related to critical thinking, even the ones who found critical thinking to be troublesome knowledge. An outsider will definitely be able to recognise that those students were teachers talking about educational issues and using terms they were familiar with in the context of teaching. The register of language they used clearly shows they are part of the community of practice of teaching; therefore, we can argue that the concept of critical thinking is indeed discursive.

4.2.3 Teaching Methods as a Potential Threshold Concept in Teacher Education

Based on the final list of potential threshold concepts in teacher education that was drawn up from the quantitative findings, the concept of teaching methods is another educational concept that can be regarded as a threshold concept. For further investigation, the concept of teaching methods was explored in the

accounts of Y4 student teachers at both ASU and CRU colleges. The following sections present how the participants perceived the concept of teaching methods in terms of these characteristics of threshold concepts: troublesome, transformative, integrative, irreversible and discursive.

4.2.3.1 Teaching Methods as Troublesome Knowledge

Faisal (interviewee 6, male 2, ASU 6) expressed his concern about having only a few teaching strategies. The way he used the term *teaching strategies* instead of teaching methods suggests that he was having problems in using teaching methods to cater for students' individual differences and make his lessons more interesting. This argument is further supported by what Faisal said as a solution to his problem; "*more reading into teaching, like I said, teaching strategies*". If he did not have any problem or difficulty with using teaching strategies, or methods, he would not have suggested that he needed more reading on teaching strategies. In spite of this argument, there was no evidence in Faisal's interview to show clearly that he was stuck in his attempt to understand teaching methods as an educational concept. He had some understanding, but he needed more knowledge on how to use teaching methods effectively in order to address students' different personalities and make his lessons more exciting.

> Faisal: (…) and also how to … add to my strategies. Maybe I have er a short, a little number of strategies onto teaching. I need more strategies … to deal with different, like I said, students with different characteristics and also make the class interesting not boring.
> Researcher: Okay, is that all?
> Faisal: Yeah, and more reading, more reading into teaching, teaching, like I said, teaching strategies. Yeah, I think that's it.
>
> **(Faisal, Interviewee 6, Male 2, ASU 6)**

Gasim (interviewee 7, male 3, ASU 7) mentioned teaching methods when he was asked the question: What knowledge do you think you need to acquire in order to become a teacher? Theoretically, he was well aware that one of the purposes of using a variety of teaching methods is to prevent students from getting bored. Moreover, he indirectly showed concern by suggesting that if a teacher finds it difficult to vary their teaching methods, he or she is likely to provide answers on the whiteboard or on handouts as a way of covering up their lack of teaching methods. As a result, Gasim said he needed to acquire knowledge on *"different strategies and methodology that can be used in the, in the classroom"* in order to make his students interested and to avoid providing answers on the whiteboard. Like Faisal, Gasim did not show any sign of being 'stuck' while talking about teaching methods, though he made it clear that he needed more knowledge on *"different strategies and methodology that can be used in the, in the classroom"*. This could indicate that Gasim views teaching methods as troublesome knowledge.

> Researcher: (…) Okay, so that's in general, so what about you now? As a teacher now … what knowledge do you think you need to acquire in order to become a teacher?
>
> Gasim: Teachers can er teachers must vary between, between their teaching methods, strategies, so that the students …do, do not get bored or do not er relate or rely only on the teacher … by explain = explaining and writing the answers … and the main, the, the areas the lesson will cover on the whiteboard or give them as handouts.
>
> Researcher: Is there, like, another knowledge you need to acquire … with all those you mentioned?
>
> Gasim: (...) And the different strategies and methodology that can be used in the, in the classroom.

(Gasim, Interviewee 7, Male 3, ASU 7)

Pasma (interviewee 16, female 7, CRU 9) also mentioned teaching methods when she was asked the question: What knowledge do you think you need to acquire in order to become a teacher? She was concerned about how to achieve the objectives of her lessons effectively without having knowledge on teaching methods. For Pasma, knowledge of teaching methods is necessary for a successful lesson. In addition, she showed much concern about students who face learning difficulties, and she wanted to know which teaching methods could be more effective with those students. For Pasma, it can be argued that having knowledge of teaching methods is essential to become a good teacher. However, like the previous interviewees, she did not show any sign throughout the interview of being 'stuck' when she faced the concept of teaching methods in her teacher education programme, even though she needed to acquire more knowledge on teaching methods.

> Pasma: Er for teaching methods, I should have, for example, I should have knowledge in … different way of deliver-delivering the content. For example, different approaches, er different ways of dealing with students; er and especially for those students who have difficulties or er like individual abilities.
>
> **(Pasma, Interviewee 16, Female 7, CRU 9)**

Qamar (interviewee 17, female 8, CRU 10) experienced teaching methods as troublesome knowledge. She faced some difficulty in understanding the concept of teaching methods when she encountered it as a student in her college. The reason she found it troublesome was because there were many methods, and she probably could not see the purpose of having many teaching methods. This can be attributed to the fact that she did not have any teaching experience in the

form of training or enough pedagogical knowledge to make sense of the relationship between teaching methods and other educational concepts such as lesson objectives and classroom management. This can be the reason why she used the word *challenging* to describe how she felt when she was trying to understand the concept of teaching methods. In the beginning, she got 'stuck' trying to make sense of the purpose of having many teaching methods, but when she started her training and applied teaching methods in the classroom, she managed to have a full grasp of the concept of teaching methods. It became clear how she could use teaching methods effectively to achieve her lesson objectives or make her lesson interesting when she said*: "whenever you apply them inside the classroom, and you see that this includes this … you will find them that they are not … much difficult for us".* Interestingly, Qamar experienced teaching methods as a troublesome concept in theory, but it was not difficult in practice.

> Researcher: (…) amongst … these concepts … have there been any specific ones which have been particularly difficult … that you really struggled with and found hard to understand?
>
> (…)
>
> Qamar: - it's about er methods. For the first time, you will find a lot of methods er in teaching, but when you = and you might say that they are challenging for us. But, when, whenever you apply them inside the classroom and you see that this includes this and this is, so on, for the, the strategies how to be applied and these things, finally you will find them that they are not much difficult for us.

(Qamar, Interviewee 17, Female 8, CRU 10)

When she was asked to provide some examples of teaching methods that were troublesome, Qamar mentioned three examples: silent way of teaching,

inductive teaching and communicative teaching. She was asked why she had found inductive teaching so difficult to understand. Qamar replied that she was not used to the concept of inductive teaching because when she was a student at school, all her teachers used deductive teaching (direct way). So inductive teaching was troublesome to her because she was not familiar with the concept (alien knowledge) when it was introduced at college. Qamar made a very interesting point when she linked her experience as a school student observing her school teachers' teaching methods to her experience as a student teacher at college. Although this observation caused conflict in her understanding of a teaching method (inductive teaching), it made her compare and contrast the two methods, which helped her eventually to understand the new concept.

Researcher: So, so why did you find … inductive … teaching difficult?
Qamar: Er inductive teaching … maybe, maybe this is because … er we used to, like, to follow deductive way of teaching. I, I can remember till now that all of my previous teachers at school, they used the inductive = er the +deductive+ -
Researcher: - +Deductive+, yeah –
Qamar: - the deductive way which is the direct way. So … they started only by explaining er the, the grammatical rule or structure –
Researcher: - Yes –
Qamar: - and give us examples, and then we have to do, like, practice.
Researcher: Good.
Qamar: But whomever er = when I studied for the ELT methods of teaching course, I found that there is also another er approach which is er like contrasting –
Researcher: -Yeah –
Qamar: - to the previous method +that I mentioned before.

(Qamar, Interviewee 17, Female 8, CRU 10)

Rashid (interviewee 18, male 10, ASU 8) mentioned teaching methods as the knowledge he needed to acquire in order to become a good teacher. Though he did not describe teaching methods as troublesome directly, he made it clear that he needed more knowledge on how *"to know and to identify the best ways of delivering the message of er of the subject"*. In addition, he was influenced by the concept of language acquisition and believed in students acquiring the language in L2 contexts alongside learning the language. When combining the two previous points, we can see that Rashid found it difficult to deal with the concept of teaching methods as a tool of creating a classroom environment that encouraged language acquisition. His concern with knowing and identifying *"the best ways of delivering the message of er of the subject"* suggests that he was most probably 'stuck' in the liminal space of his attempt of understanding the concept of teaching methods.

> Researcher: Okay. Now, this is for you now, since you're going to be a teacher in the near future. So what knowledge do you think you need to acquire … in order to become a teacher?
>
> Rashid: I think the most important knowledge I need to acquire is that what are the best ways for the students to, to learn what they have to learn. For example, I need to teach them grammar. First of all, I need to know, what are the best ways for them to learn the grammar rules? This is what we have been taught in the, in the College of Arts. Er the course is called Language Acquisition. Like, how the children or the students, how they acquire the, the different things, for example the grammar rules, the reading. So I think this is the foundation of being a good teacher. And er of, of being = of having, like, the knowledge is to know and to identify the best ways of delivering the message of er of the subject.
>
> **(Rashid, Interviewee 18, Male 10, ASU 8)**

4.2.3.2 Teaching Methods as Transformative

Asmaa (interviewee 1, female 1, ASU 1) experienced transformative learning through the concept of teaching methods in terms of an epistemological as well as ontological change in her identity as a teacher and as a person. Epistemologically, she realised that relying on one method of teaching was not enough to involve students in the class as it could lead to spoon feed students with the answers if a variety of teaching methods were not employed. It can be inferred that Asmaa had a bad experience when she was a student at school seeing her teachers spoon feeding the students due to a lack of variety in their teaching methods. Her knowledge about teaching methods made her become aware that using various teaching methods can give her more options to interact with her students and offer more opportunities to get her students to participate and become active learners. This epistemological shift in her knowledge triggered by the concept of teaching methods helped her to identify herself as a teacher when she said: *"I understand that I should as a teacher to vary my … strategies in teaching*".

> Researcher: (…) Amongst, amongst all the educational concepts you have, you know, mentioned in this interview, have there been any specific ones that have fundamentally changed the way in which you look, in which you see the world and yourself?
>
> (3-second pause)
>
> Asmaa: Okay maybe the strategy of teaching itself. I used to only follow one strategy which is the … the old one just go in front of the class and teach and spoon feed, maybe we can say, the students. Now no. I have gained so many knowledges. I, I get = I understand that I should as a teacher to vary my … strategies in teaching. I use more

than one method during one period maybe or …so maybe strategies of teaching.

(Asmaa, Interviewee 1, Female 1, ASU 1)

As for the ontological change, Asmaa provided an example of how teaching methods helped her to see herself and the world in a different way. She transferred the knowledge of using different teaching methods in class to her life outside school. Based on the fact that she used different teaching methods to cater for students' individual differences, Asmaa used the same idea when she was dealing with her friends and family members. She said: *"We cannot deal … er all people with one way. Different personalities with different … er treatment maybe"*. Arguably, Asmaa reached this life-fact conclusion after she had a successful experience using teaching methods to cater for the individual personalities and differences of her students in the classroom.

Researcher: (…) Could you give me some examples of how these concepts have helped you see the world and yourself in a different way?

(3-second pause)

Asmaa: Ok in my class as I said there are so many different … er differences between students …This, this thing is … also in my real life. So I can … er … follow this in my real life-

Researcher: -How? How?-

Asmaa: It's okay we have different personalities… er my friends my family.

Researcher: Yeah good yeah. It's really good.

Asmaa: Yeah I can apply it in my real life … and er using different …er strategies so with dealing with people. We cannot deal … er all people with one way. Different personalities with different … er treatment, maybe.

(Asmaa, Interviewee 1, Female 1, ASU 1)

Eyas (interviewee 5, male 1, ASU 5) also had a powerful transformative experience that changed his long-held belief system when he understood the concept of teaching methods. According to him, he had always viewed life as black and white since childhood with no room to consider other options. His perception could be attributed to strict parents or strict religious practices. Eyas grew up believing in only one way of doing things correctly until he encountered the concept of teaching methods in his teacher education programme. During his lectures and training sessions, he discovered that there were other effective ways to achieve the lesson objectives. This pedagogical knowledge helped him experience an epistemological shift to where knowledge is not restricted to one method, way or view. Rather, it could be gained through different ways as he explained: *"There's always a different er … a different way to do things"*. This epistemological change in his belief system paved the way for an ontological shift where Eyas views himself as a person who is no longer restricted to one way or another. This became obvious through his words: *"It's not like er … a holy book that only says do this or do that. No, it's more er open"*.

Eyas: Have influence to me? Maybe it's er teaching techniques.
Researcher: Okay.
Eyas: Er … er since I was young I, like, I had this belief that life is … black and white.
Researcher: Mmm.
Eyas: But when it comes to teaching techniques it's always different. There's always a different er … a different way to do things. Er I am, you know, I, I shouldn't stop, like, or shouldn't go only this way.
Researcher: Mmm.
Eyas: There is right and left there's = that's not enough. I can draw my own routes. I can do something else. When it comes to teaching technology er +techniques+ -

Researcher: - +Teaching techniques, yeah?+ -

Eyas: - er it's different. There's always another way. There is always a new technique. There is always something that will fit in the situations. It's not like er … a holy book that only says do this or do that. No, it's more er open.

(Eyas, Interviewee 5, Male 1, ASU 5)

4.2.3.3 Teaching Methods as Integrative, Irreversible and Discursive

In the interviews, the participants who mentioned teaching methods either as troublesome knowledge or transformative knowledge also discussed the term with other related concepts. For instance, Faisal (interviewee 6, male 2, ASU 6) mentioned teaching methods as a tool needed to cater for students with different characteristics and individual differences. Gasim (interviewee 7, male 3, ASU 7) used the term *methodology* when he talked about teaching methods. As for Pasma (interviewee 16, female 7, CRU 9), she discussed how the concept of teaching methods would help her deliver the teaching content, meet individual differences and assist students with learning difficulties. Qamar (interviewee 17, female 8, CRU 10) discussed inductive and deductive learning as an example of teaching methods being troublesome. As for Rashid (interviewee 18, male 10, ASU 8), he used the term *language acquisition* when he wanted to have more knowledge on teaching methods in order to create a teaching environment for students to acquire the language. Asmaa (interviewee 1, female 1, ASU 1) stated that teaching methods helped her avoid spoon feeding and helped cater for students' individual differences and different personalities. Finally, Eyas (interviewee 5, male 1, ASU 5) used the term *techniques* and *learning situations* to talk about teaching methods. Though the study did not ask direct questions on how the concept of teaching methods was integrated with other concepts, it

can be argued that the interviewees' accounts do provide some evidence of teaching methods as integrative.

Concerning the characteristic of irreversible, many participants were able to remember and use the term *teaching methods*. However, some of them used other words with similar meanings such as *teaching strategies* or *teaching techniques* to talk about the concept of teaching methods. As a concept, it is irreversible, but as a term, it seems that students were used to synonyms or other similar terms.

The concept of teaching methods helped the interviewees articulate their ideas in a professional way. They were able to express their concerns and opinions in a way that could be understood by any teachers around the world. As discussed in the previous two paragraphs, the interviewees used lots of educational terms related to teaching methods and this is evidence that the concept of teaching methods has the characteristic of being discursive.

4.2.4 Classroom Management as a Potential Threshold Concept in Teacher Education

Classroom management is one of the potential threshold concepts in teacher education included on the final list of the quantitative findings. The following sections explore first how Y4 student teachers experienced the concept of classroom management as troublesome knowledge and then as a transformative concept. Section 4.2.4.3 discusses how classroom management could be described as integrative, irreversible and discursive based on interviewee's accounts.

4.2.4.1 Classroom Management as a Troublesome Knowledge

Camla (interviewee 3, female 3, ASU 3) expressed that classroom management was still troublesome when she was asked if she had faced any difficult educational concepts during her studies. Even though she used the phrase *"I might say not too difficult to understand, too difficult to apply"*, it can be inferred initially that Camla actually found classroom management an easy concept to understand. Yet, it can be argued further that she experienced a two-layered level of difficulty in understanding classroom management: difficult to understand it and too difficult to apply it. Whether she found it difficult or easy to understand, Camla faced a problem having a full grasp of classroom management during her training lessons. According to her, she failed to keep students focused on her lesson as they kept moving and talking to each other and not paying attention to her lesson delivery. She used the phrase *"I'm struggling with this issue"* to describe her experiences, and this indicates that she is still 'stuck' in the liminal space of being unable to cross the concept of classroom management. Camla was totally aware of her being 'stuck' in the liminal space of classroom management; therefore, she addressed the importance of classroom management and wanted more practice on how to manage a classroom before she became a full-time teacher.

> Researcher: Okay you're about to graduate –
> Camla: -yes-
> Researcher: - and become a teacher so you go to schools. Are there still any educational concepts you find them too difficult to understand and what are they?
> Camla: I might say not too difficult to understand, too difficult to apply. The classroom management … I'm … struggling with this issue in the semester during this training … because er each lesson and each

period with the specific er grade, grade 8/2. I'm struggling with them because they … er they talk a lot. They … move during my er (2-second pause) during my speech, during the class.

Researcher: Mmm yeah.

Camla: They move, they move to each other to talk about something outside the class.

(…)

Camla: Yes. So I think the classroom management is very important and we need the practical er … training for this in the … before we go to the field … in the teaching method 2 and 1.

(Camla, Interviewee 3, Female 3, ASU 3)

Another interviewee, Faisal, (interviewee 6, male 2, ASU 6) also acknowledged classroom management as troublesome knowledge when he was asked if he still found any educational concepts too difficult to understand. He expressed his concerns about being unable to fully understand classroom management. Therefore, Faisal is still 'stuck' in the liminal space as he has not fully grasped the concept of classroom management. He mentioned factors affecting his classroom management such as students' age, students' levels of English and individual differences. These factors made classroom management too confusing and too difficult for him to understand.

Researcher: Okay. Okay so as you know you're about to graduate –

Faisal: - Yeah –

Researcher: - and become, you know, a teacher working in the field, you know, at schools. So are there still any difficult concepts you find them too difficult to understand?

(8-second pause)

Faisal: Nothing comes to my mind. Maybe … (2-second pause) maybe like er classroom management. I still don't have a full grasp on that like … I do = I can use management. Sometimes, it's, it gets difficult

because you have = and the younger the students, the more difficult it is. And … (2-second pause) and … dealing with students with different levels of English.

Researcher: Yeah.

Faisal: Yeah. (2-second pause) I think it's mostly on …= To me, it, it all depends on class, how to manage that classroom, and how you under = how, how you …, like, understand or yeah how to deal with each student … and, like, to consider … considering their different characteristics. Some smart = I won't, I don't want to say smart and stupid, but some … the levels differ.

(Faisal, Interviewee 6, Male 2, ASU 6)

Laith (interviewee 12, male 7, CRU 5) described dealing with students as troublesome when he was asked to give an example to show that he felt he was a teacher. Though he did not mention classroom management per se, the term he used *'dealing with students'* is part of classroom management. When the researcher mentioned classroom management to remind Laith of the term in case he forgot, he differentiated between classroom management and dealing with students as two unrelated different concepts. His own perception of classroom management was limited as he understood it as a way of having full control. For him, classroom management could be described basically as class control where teachers have full control and students do not make noise or even interact with their teachers: a strict teacher-centred approach. Clearly, Laith did not have a full understanding of classroom management as he thought it to be only controlling the class and not allowing students to make noise. He was unaware that managing a class is also about considering students' different personalities and different abilities in order to get students actively involved in the lesson. Arguably, Laith was unaware he was actually 'stuck' in the liminal

space of classroom management, but he did see dealing with students as an issue.

> Researcher: Okay, another er another example to show that you are a teacher?
>
> Laith: Yes, dealing with students really , I mean, …. really, really, I mean, difficult thing.
>
> Researcher: I think you mean … class management.
>
> Laith: Yeah, class management is really er, I mean, important part, but dealing with the students themselves. Maybe you can control this er class. They will not, like, make noise or anything, I mean -
>
> Researcher: - Er okay, I got the point now -
>
> Laith: Yeah, but dealing with them, maybe they will be a bit afraid from you, they will not talk … +they won't make noise+ -
>
> Researcher: - +Yeah, that's right+ -
>
> Laith: Yeah, but in order to make them love your, I mean, the subject you are teaching them. This is what we mean er we meant by dealing with them … different abilities, different kinds of students.

(Laith, Interviewee 12, Male 7, CRU 5)

Omaima (interviewee 15, female 6, CRU 8) also expressed her need to improve classroom management when she responded to the question about the knowledge she needed to acquire in order to become a teacher. Even though she did not mention the concept of classroom management, it can be understood from her narrative that she needed more knowledge on classroom management by her use of terms and phrases directly related to classroom management such as *'learning how to manage time'*, *'huge number you need to organise'* and *'to achieve the aims'*. Based on what she said, Omaima was very concerned about her ability to achieve the lesson objectives with large classes. It can be inferred that she had a bad experience after she faced difficulty in

managing her big classes when she went to school for training. That was why she pointed out that she still needs more knowledge on classroom management. As she needed to improve time management and dealing with large numbers of students (both related to classroom management), this indicates that Omaima is still 'stuck' in the liminal space of classroom management.

> Researcher: Er okay. Now about you, what knowledge do you think you need to acquire in order to become a teacher?
>
> Omaima: Er I'm still beginner and I think I need to improve many things. (…) As well as learning how to manage time … with students, because er huge number you need to organise, divide. You don't accept every single answer and do finish the = or to achieve the aims that you have put forward to, to achieve at the end of the lesson.

(Omaima, Interviewee 15, Female 6, CRU 8)

Another student, Qamar (interviewee 20, female, ASU10) explicitly mentioned classroom management as troublesome knowledge when she was asked about difficult concepts she still did not understand. She got confused understanding the concept because of her conflicting experiences with her instructor at college and the head teacher at school. At college, she understood that classroom management was only about the physical arrangement of the classroom seating as she said: *"how you are going to seat er your students inside the … classroom"*. It can be inferred that her understanding of classroom management was only linked to pair and group work where students need to be seated in a specific way so they can do the tasks assigned to them. It seems she held that understanding for quite a long time until she discovered with the help of a head teacher when she went to school for training that classroom management is

more than the physical arrangement of the classroom. As she said in her interview: *"it involves other things, not only the seating"*. Initially, Qamar might have got confused when her understanding from her college instructor was challenged by the head teacher, an experienced teacher. It was probably not easy for Qamar as a student teacher to accept what the head teacher had told her and she might have started to question who was right: the college instructor or the head teacher. Eventually, Qamar started to realise that classroom management is more than just arranging students' desks and chairs when she said: *"So it's a wide, like, a wide term that cannot be specifically for only for er classroom seating"*. Although she is still somewhat 'stuck' in the liminal space of understanding the concept of classroom management, Qamar seems to be ready to move from the liminal space to the postliminal space as she becomes more aware of what classroom management means and what it involves.

Researcher: - So are there still any difficult concepts you don't understand?

(…)

Qamar: Till now, I still don't get it er these two concepts er which are er, like, assessment or evaluation at the same time, and er what the other thing is the classroom management. (2-second pause) er We have previously before this er course, we had … two courses for practicum 1 and practicum 2. And we always repeated it these terms, but till now I, I couldn't, like, I, I cannot understand what they mean actually. er We studied = like we = the teacher and as I understood that for classroom management is about how you are going to seat er your students inside the … classroom. But, whenever I went to er at school, the head teacher there told me that this is not actually the, the right definition for classroom management. There is = it al-also involves other things, not only about the seating, also about how you manage your techniques, how you manage your students. So it's a

wide, like, a wide term that cannot be specifically for only for er classroom seating.

(Qamar, Interviewee 17, Female 8, CRU 10)

4.2.4.2 Classroom Management as a Transformative Concept

In response to the question of any educational concepts that had a huge impact on themselves which made them see themselves and the world in a different way, none of the interviewees mentioned classroom management as having a transformative effect on them per se. However, one interviewee, Faisal (interviewee 6, male 2, ASU 6), made a very interesting comment when he was asked why he wanted to be a teacher. Though he did not directly mention the term *classroom management*, he used the phrase *'it gives me managing skills'*, which is thematically related to classroom management. With those managing skills, he could, as reported, manage his kids when he would start a family. For Faisal, classroom management is not a concept to be understood and used in the domain of a career, but it is also a concept that could be applied in his life outside the classroom. This transformative learning Faisal experienced in showing concern about how to raise his kids even before getting married, could be due to the fact that Faisal realises how difficult it is to raise kids these days. Therefore, teaching in terms of managing students in class (classroom management) is like a training session for Faisal's future family regarding raising kids with guidance and support. With this perspective, he sees himself and his position in society in a different way and is experiencing an ontological shift in his life as a person.

Faisal: The … it = the one of the reasons is like … it helps you in managing = it gives you managing skills which will = and also like teaching

which will help you later when you start raising your own kids, so it will be very useful.

(Faisal, Interviewee 6, Male 2, ASU 6)

In another part of the interview, Faisal emphasised the importance of classroom management as a piece of knowledge he should acquire in order to become a teacher. He used the phrase *'to be like perfect in classroom management*', which implies that he is very concerned about achieving his lesson objectives and fulfilling his job requirements. When Faisal's comment here is connected to his previous one, it can be concluded that classroom management has had a huge transformative impact on Faisal as a teacher as well as a person in terms of ways of thinking and ways of practising.

Faisal: I think the top one in my opinion is … classroom management. To be like perfect in classroom management, because if you can't manage your class, then it will be difficult to deliver the, the knowledge or what, what you are trying to teach.

(Faisal, Interviewee 6, Male 2, ASU 6)

The following three excerpts are further examples of interviewees who addressed the importance of classroom management in their careers as teachers.

Camla: Yes. So I think the classroom management is very important and we need the practical er … training for this in the … before we go to the field … in the teaching method 2 and 1.

(Camla, Interviewee 3, Female 3, ASU 3)

Laith: Yeah, class management is really er, I mean, important part, but dealing with the students themselves. Maybe you can control this er class. They will not, like, make noisy or everything.

(Laith, Interviewee 12, Male 7, CRU 5)

Qamar: (…) Also the classroom setting er I think that it is very important for the teacher to know such know = such knowledge because the classroom management or setting is also er affected by students' learning.

(Qamar, Interviewee 17, Female 8, CRU 10)

4.2.4.3 Classroom Management as Integrative, Irreversible and Discursive

Based on the students' narratives in the previous sections, classroom management was mentioned directly and indirectly alongside other educational concepts such as teaching methods, individual differences, time management, and collaborative learning. In her account, Camla (interviewee 3, female 3, ASU 3) linked classroom management to teaching methods when she stated: *"So I think the classroom management is very important and we need the practical er … training for this in the … before we go to the field … in the teaching method 2 and 1"*. As for Faisal (interview 6, male 2, ASU 6), he mentioned classroom management in dealing with students' individual differences by stating: *"I can use management. Sometimes, it's, it gets difficult because you have = and the younger the students, the more difficult it is, and …dealing with students with different levels of English".* Omaima (interviewee 15, female 6, CRU 8) indirectly linked time management with classroom management when she pointed out, *"As well as learning how to manage time … with students, because er huge number you need to organise, divide. You don't accept every single answer".* As for Qamar (interview 17, female 8, CRU), she mentioned classroom management as a way to facilitate collaborative learning in terms of managing

group work by saying, *"because the classroom management or setting is also er affected by students' learning. You want them er to work in groups, so they will be more collaborative and so on*". Arguably, classroom management is not an isolated concept that does not affect other educational concepts. Rather, it could unlock or at least make other concepts more accessible to student teachers' understanding. Though there were no direct questions in the interviews on how classroom management integrated with other concepts, there is evidence to support its description as integrative as shown in the interviewee's accounts.

Most participants who mentioned classroom management were able to remember and use the term *classroom management* correctly within its context in their accounts. They did not receive any help from the interviewer to remember the term or remind them of the concept. Therefore, it can be concluded that once the concept of classroom management is understood, it is irreversible and cannot be forgotten.

All the interviewees who mentioned classroom management were able to articulate their experiences using the pedagogical terms of the community of teaching practice. Terms such as *classroom management, teaching methods, managing your techniques, time management, dealing with students, different levels of English, group work, and collaborative learning* can be easily understood by all teachers around the world. Therefore, the concept of classroom management has the feature of being discursive as it helps student teachers express their ideas in a professional way.

4.2.5 Assessment as Potential Threshold Concept in Teacher Education

The concept of assessment is the final educational concept on the final list of potential threshold concepts in teacher education. Based on the Y4 student

teachers' accounts in the interviews, there is evidence that assessment plays a vital part in constructing epistemological and ontological knowledge in the participants' lives. The following sections present the concept of assessment as troublesome knowledge, transformative, integrative, irreversible and discursive.

4.2.5.1 Assessment as Troublesome Knowledge

Laith (interviewee 12, male 7, CRU 5) experienced assessment as troublesome in terms of designing exams. He found it very difficult to design questions suitable to test students' knowledge when he said: *"not too easy not too difficult"*. Although he did not mention them directly, it can be easily inferred that Laith was having a problem with test validity and reliability; in other words, how to design an exam that is valid and reliable. In addition, it can be also argued that he also had a problem with exam fairness since he used the phrase *"so finding out er a question really good question is not too easy not too difficult for my students, this is really, really a problem"*. Laith was aware that designing exams was part of any teacher's job, and because of that he showed much concern by using the phrase *"this is really, really a problem"*. He was clearly 'stuck' in the liminal space of trying to understand the concept of assessment and sought help from his colleagues and instructors at college or school.

> Researcher: Are you still struggling with … some concepts?
> Laith: Yeah in assessment … designing like … er exam … or final exam. This is really, really important. We as teachers, we have to know how to design an exam or test or whatever, you can name it. So this is really, really a problem. I can't like … I have a problem with it. So finding out er a question really good question, not too easy not too difficult for my students, this is really, really like … er I have really, really a problem with it. So I have to … er get back to my friends, I

mean my colleagues or my er teachers there in the schools and also here in the … in the college.

(Laith, Interviewee 12, Male 7, CRU 5)

Pasma (interviewee 16, female 7, CRU 9) also experienced assessment as troublesome knowledge in terms of validity and reliability when she was asked to recall the most difficult educational concepts she had struggled with. Unlike Laith, the previous interviewee, she was well aware of validity and reliability which made assessment a difficult concept for her to understand in the beginning. She attributed her lack of having a full grasp of the concept of assessment to the ambiguity of validity and reliability.

Researcher: Now, amongst these concepts, have there been any specific ones which have particularly difficult … that you really struggled with and found extremely hard to understand?

Pasma: Yes.

Researcher: Which ones were they?

Pasma: Er actually as I mentioned before, I told you that I studied assessment as a course here in, in this college. There are some educational concepts that I didn't er get actually from the first time, because they are somehow ambiguous. If we start with, we can = I can mention the first one vali-validity.

(Pasma, Interviewee 16, Female 7, CRU 9)

Pasma found validity ambiguous when it was introduced by her assessment instructor at college, who explained to the class that any exam should be valid. The ambiguity of validity, according to her, stemmed from the fact she had encountered validity in another course that was not related to education. Though she did not name the course, it can be inferred that it was a course about

research methods. Having prior knowledge (schemata) of validity within a different context caused Pasma to get confused and wonder what validity had to do with designing exams. Though prior knowledge usually helps students construct knowledge with no difficulty, in Pasma's case, validity within the context of language assessment worked as counterintuitive knowledge and created troublesome knowledge for her.

> Pasma: And you know, at that time, the teacher was saying when you did an exam, the exam should be valid. And we didn't know what does valid mean er because you know, it is related to … to … to the exams, of doing exams and so on. But at that time, we didn't realise that it is er related to exams and so on. We, like, = I, I think I heard it about something else: how it comes with education?!
>
> (….)
>
> Pasma: (…) And I didn't understand how it is related … to, to exam. I, I heard about it re-related to something else, but how it comes to education. So for that reason, I found it somehow difficult for me to understand it.
>
> Researcher: So, it was difficult because it was also confusing?
>
> Pasma: Yes, because it was confusing and it is a new concept for us at that time.

(Pasma, Interviewee 16, Female 7, CRU 9)

Pasma faced the same issue with understanding reliability. She could not make sense of the phrase *"the exam should be reliable"* as she was not familiar with the concept of reliability. As she said in her account, she struggled a lot trying to understand how an exam can be reliable. What made her experience with reliability as well as with validity even worse was that she had a project to design an exam. Consequently, she went through a hard time trying to understand the two concepts, and the phrase in her account *"I keep thinking*

how the exam should be reliable" indicates that she really got 'stuck' and remained in a liminal space for a long period of time.

> Pasma: Reliability, it was like er … it is = it goes with validity, because they are two concepts that I learned in assessment course. So, I think they = it was difficult because the teacher keeps repeating that the exam should reliable. And I keep thinking how the exam should be reliable, and I didn't understand what reliable means. So, er it er = I struggle a lot with this er this concept because I have to apply it in my project when I'm doing the exam. At that time, I was thinking what does this mean to just apply it in my = in doing the exam, and I have to submit it to school.

(Pasma, Interviewee 16, Female 7, CRU 9)

Qamar (interviewee 17, female 8, CRU 10) also experienced assessment as troublesome knowledge according to her answer regarding the question about difficult concepts that she still did not understand. The reason she found it so difficult to understand was stemmed from the differences in the training she received at college as a student teacher and at school as a trainee. Similar to the case of the previous interviewee Pasma, there was a mismatch between Qamar's prior knowledge of assessment as received at college and the new knowledge on assessment she had to construct at school. This mismatch caused her to get confused about the correct way to assess students individually or in pair/group work. Consequently, Qamar was 'stuck' in a liminal state trying to understand the concept of assessment and how it could be effectively applied when assessing students.

> Researcher: - So are there still any difficult concepts you don't understand?
>
> (…)

Qamar: Yes. For the assessment, we studied that it involves whole observation in pair er pair work, group work and individual observation. Er but at school they say that you have also to specify particularly which students to assess. So that was not actually matching with what we study. So, by the end, I still … I, I, I don't er think myself that I, I am willing, like, to know them er clearly but –

(Qamar, Interviewee 17, Female 8, CRU 10)

4.2.5.2 Assessment as Transformative

Asmaa (interviewee 1, female 1, ASU 1) experienced some transformative learning from assessment when she was asked about any educational concepts that had changed the way she saw the world and herself in a different way. Before understanding assessment and based on her experience as a student at school, she thought that there was only one way to assess students' performance through quizzes and exams. However, her previous knowledge on assessment changed when she became aware that there are other types of assessment that can be used to assess students' progress. When she was asked to give an example of her new knowledge, she mentioned formative assessment which is used for continuous assessment and focuses on the process rather than the product of students' learning through projects, checklists and reports. This epistemological change in her knowledge opened her eyes to other types of assessment that could be used effectively to assess students' performance rather than depending on summative assessment in the form of quizzes and exams. As this was the first interview conducted, the researcher, although establishing assessment as transformative, missed opportunities to encourage Asmaa to elaborate more on her experiences in order to find out if

she experienced any ontological shift in herself as a teacher as well as a person.

> Asmaa: I studied assessment. Err … I used to … to understand the assessment as one … like quizzes giving quizzes or exams. This is only not … one way. There are so many other assessments that I can follow now-
> Researcher: Such as?
> Asmaa: Sub er … formative assessment, right?
> Researcher: Yeah formative, yeah? Formative assessment.
> Asmaa: Summative. The other one? (laughing)
> Researcher: Summative.

(Asmaa, Interviewee 1, Female 1, ASU 1)

Dalal (interviewee 4, female 4, ASU 4) experienced a powerful epistemological and ontological change when she understood that assessment is not only a tool for assessing students' performance, but there is also an ethical philosophy involved in terms of using assessment to judge students fairly. Epistemologically, with her newly constructed knowledge of assessment, she became aware that judging a student based on only one performance or one action is not enough to have a full picture of their abilities. She realised that it requires more than one type of assessment and more than one instance to ensure a fair judgment as she said: *'judging others will depend on certain other criteria"*. She gave the example of using written and oral assessment to justify her new understanding of assessment.

> Dalal: Maybe the assessment courses, where you are not judging only one person about … his er like in one performance or in one event or one action. So, I think judging others will depend on certain other criteria. For example if we're talking about assessment that …

assessments differ like there is a written assessment, there is er oral assessment and so on.

(Dalal, Interviewee 4, Female 4, ASU 4)

As a result, this epistemological change helped Dalal to experience a powerful ontological shift in seeing people around her. She formulated a new ethical perception of how to judge a person as good or bad. According to her, one situation or behaviour does not determine whether a person could be considered good or bad. Based on her experience with assessing students in class, she has become aware that it takes more than one behaviour or situation to be able to judge people.

Dalal: So, also in the world like our personalities, seeing others. You cannot say that this is a good person, this is a bad person according to one situation or according to one behaviour or one mark, for example. So, assessments like evaluating others and people it's like –

(…)

Dalal: Yeah I think assessment is the most er thing that changed my mind according to the world and so on

(Dalal, Interviewee 4, Female 4, ASU 4)

Pasma (interviewee 16, female 7, CRU 9) experienced transformative learning from the concept of assessment (reliability) on the ontological level. When she was asked about any educational concepts that had impacted her greatly and made her see the world and herself in a different way, she mentioned reliability (a thematically assessment-related sub concept) as a concept that helped her become a reliable person who should treat people equally. According to her, she

has become aware that meeting people with different personalities and from different backgrounds in different situations should not change her personality, manners or beliefs. Pasma used the phrase *"I have to be reliable if I come across another … situation exactly the same"* to show that she should treat people the same and not become a different person.

> Pasma: Er that's a nice question, actually. If we start from reliability, you know er this world is … = in this world you face lots of people. Er … they are, for sure, they are not … in the same level and in the same … the same, the same class. So, I, I, I see this concept is very useful in my life because this taught me that I have to be a reliable person. What does that mean? It means, like, for example, if I treat, if er I treat this person in this situation like this one in this manner, I have to be reliable if I come across another … situation exactly the same.
>
> **(Pasma, Interviewee 16, Female 7, CRU 9)**

Pasma further explained that being a reliable person means that she has to be the same person: a reliable person who keeps the identity of oneself as it is regardless of the same or different situations involved. This new representation of being reliable with people can be inferred from the metaphor she used "*you don't have different pictures of you"*.

> Pasma: +So+, this is er like you have not to be er … you have = like you don't have –
> Researcher: - to have, like, to have +different+ -
> Pasma: - +different+ pictures of, of you –
> Researcher: - or personalities even.
> Pasma: Yes exactly. (…)
>
> **(Pasma, Interviewee 16, Female 7, CRU 9)**

Although she addressed the possibility of situations that might require people to act in different ways, what seemed important to Pasma was how to keep treating people equally and not being accused of having double standards. According to her, being a reliable person in her life has helped her treat people equally. It is clear that being reliable has become a life principle for Pasma when she meets and treats people.

> Pasma: (…) You should restrict to one and treat all people. I er = you may say that in some situations we have to be for example like this and like that. It is not about all these things, but this is actually about the idea you treat people. Don't er treat these people like this one, and this, this is –
>
> **(Pasma, Interviewee 16, Female 7, CRU 9)**

Qamar (interview 17, female 8, CRU 10) did not mention assessment as a concept that had a huge impact on her and made her see the world and herself in a different way. However, it can be inferred that when she used the ph*rase "to be fair"* as one of the differences between her as a teacher and other people, she was influenced by the concept of assessment, especially she mentioned it as troublesome knowledge (see section 4.2.5.1). Accordingly, it can be argued that because of assessment (being fair when assessing students) Qamar experienced some ontological shift in the way she treats people. As appearance was not one of the criteria in assessing students as she learned in her training, Qamar has transferred that knowledge to her view of being fair with people and treating them equally.

Researcher: Another difference between you and other people outside?
Qamar: (…) to be also fair among others. I like to treat er people not according to the = to their appearance and so on, but I like to treat them like they are er = to me, they are all er equally, so without any differences.

(Qamar, Interviewee 17, Female 8, CRU 10)

4.2.5.3 Assessment as Integrative, Irreversible and Discursive

Based on the interviewees' narratives, assessment was not mentioned in an isolated manner, but rather it was discussed with other educational concepts. For instance, Qamar (interviewee 17, female 8, CRU 10) mentioned *group and pair observation* when she talked about assessment as troublesome knowledge. Also, she talked about *fairness* and *individual differences* when she described the difference between herself as a teacher and other people. Asmaa (interviewee 1, female 1, ASU 1) explained how assessment through *formative* and *summativ*e types helped her understand that there are other types of assessment, not just exams. Dalal (interviewee 4, female 4, ASU 4) used concepts such as *judgement, performance*, *different personalities* and *evaluation* in her explanation of how assessment had impacted her. Pasma (interviewee 16, female 9, CRU 9) used the concepts of *validity* and *reliability* both in her description of assessment as troublesome knowledge and in her example of assessment as a concept that had a huge impact on her life.

Most of the participants who addressed assessment were able to remember the term and other terms related to it. Their lack of struggle to remember the term further supports the concept of assessment as being irreversible.

In terms of the discursive characteristic, all the participants who mentioned assessment were able to express their ideas clearly as if they were full-time teachers. They were able to voice their concerns regarding the difficulty of understanding and applying assessment in the classroom. In addition, they managed to support their arguments when they discussed how assessment changed the way they see themselves as teachers and people. They were able to use many educational terms to discuss many educational issues related to assessment. Arguably, their accounts also show evidence of belonging to the community of teaching practice, or what Wenger (1998, pp. 154-155) describes as the 'peripheral trajectory': access to community and practice.

4.2.6 Summary of the Qualitative Findings

Twenty interviews were conducted at two Omani colleges (ASU and CRU) with the aim of identifying the potential threshold concepts that had been generated from the quantitative analysis. As a result, the findings of the qualitative analysis show that critical thinking, teaching methods, classroom management and assessment are troublesome knowledge and they also have an impact on students' ways of thinking and practising. Not only have troublesome and transformative characteristics been addressed, but integrative, irreversible and discursive characteristics have also been identified with these concepts. Therefore, we can add to the literature on threshold concepts that critical thinking, teaching methods, classroom management, and assessment have been identified as threshold concepts in teacher education. The next chapter presents a discussion of the findings and provides a better understanding of the nature of threshold concepts.

CHAPTER 5: DISCUSSION OF FINDINGS

5.1 Introduction

Identifying threshold concepts is more complicated than it seems, especially if we delve deep inside students' minds to explore the actual process of interacting with knowledge without the researcher's influence. The analysis of the data of this research study reveals an insightful exploration of what actually transpires in students' cognitive systems and how they really experience educational concepts in their teacher education programmes in order to develop an initial teacher identity. A discussion of the findings of this research study now follows.

5.2 Threshold Concepts as a Channel to the Development of Initial Teacher Identity

In the literature review (see section 2.6), the notion of how learning is a 'process of becoming' (Wenger, 1998, p. 215) and a 'form of identity work' (Cousin, 2006, p. 264) was discussed. Logically, experiencing and acquiring threshold concepts is a deeper form of learning as it addresses the highest layer of knowledge, mental models, as classified by Hattie and Yates (2014) (see section 2.3). On the other hand, it has also been established that threshold concepts can contribute to the formation of professional identity as they lead to 'a transfiguration of identity' (Meyer & Land, 2005, p. 375) and lay the groundwork for 'coherent ways for thinking and practising' (Davies, 2006, p. 71) (see section 2.6). In this regard, Y4 participants at both colleges revealed clear signs of an epistemological as well as ontological shift on their journey to developing their initial teacher identity when they experienced critical thinking, teaching methods, classroom management, and assessment. They expressed a sense of

belonging to the community of teachers (a community of practice) when they were asked: *Being a teacher, what makes you different from other people?* For instance, Nabeel (interviewee 14, CRU 7) narrated, *'we deal with human beings, so, with different brains, so we need to … we need to know how to encourage er these children or these kids to be thinkers*.'

Another important point which supports the contribution of educational threshold concepts to the development of initial teacher identity is the fact that Y1 and Y4 participants' perceptions of threshold concepts change and evolve according to their progress. As reported in Chapter 4, the educational concepts that were considered troublesome and transformative in Y1 such as phonetics, academic writing and syntax were not mentioned as potential threshold concepts in Y4. Most of those concepts, except critical thinking which remained consistent, were replaced with more advanced, more complicated, discipline-oriented educational concepts such as classroom management, teaching methods, assessment, reflection, communicative approach and learner-centred approach.

As the student teachers at both colleges, who are going to be teachers of the English language, were themselves non-native speakers of English, the linguistic aspect was prevalent amongst the concepts they had been experiencing as troublesome and transformative in their Y1 of study. The Y1 student teachers were very worried about how to improve their linguistic proficiency; therefore, their perception of acquiring knowledge was influenced by those language-oriented educational concepts. On the other hand, student teachers of Y4 who had probably mastered those language-driven concepts were more concerned about their careers as teachers. As a result, they were more involved in mastering pedagogical concepts in order to think, talk and act

as teachers. In other words, Y1 student teachers who are non-native speakers of English are more concerned about linguistic knowledge rather than pedagogical knowledge, whereas Y4 student teachers who are about to graduate are more concerned about pedagogical knowledge rather than linguistic knowledge. By the Y4 phase, we can argue here that a sense of initial teacher identity was established and developed as those pedagogy-oriented educational concepts contribute to the formation of teacher identity. When the journey to becoming an English teacher begins, Y1 students first see themselves as learners of English, whereas Y4 student teachers eventually see themselves as teachers of English. Thus, a development of initial teacher identity is reinforced by educational threshold concepts.

5.3 The True Nature of Threshold Concepts as Perceived by Students

In section 2.3, we have argued that learners' perceptions of knowledge play a vital role in experiencing and interacting with knowledge. Such experiences and interaction with knowledge determine the pieces of knowledge students perceive as the most important ones**.** Not only are they seen as essential, but also learners' perceptions and conceptions of knowledge are regularly formed and reformed due to changing micro and macro factors such as learning orientations as well as political, economic and cultural contexts (Beaty et al., 1997; Entwistle & Peterson, 2004; Vermunt, 1998). In addition, as student teachers have not yet developed teacher identity, their beliefs, personal theories, values and attitudes about teaching and learning for developing an initial teacher identity are constantly shaped and reshaped by the knowledge of the self and the knowledge of the professional context (Beauchamp & Thomas, 2009; Beijaard et al., 2000; Flores & Day, 2006) (see section 2.6.2.1). Such evidence can be

supported by the research data of the educational concepts that were seen as troublesome and transformative by Y1 and Y4 student teachers. Educational concepts reported by Y1 student teachers in the two colleges were language-driven like grammar, phonetics and academic writing. On the other hand, those concepts reported by Y4 student teachers at the same colleges were pedagogy-driven such as critical thinking, teaching methods, classroom management, assessment, reflection and learner-centred approach. Due to the fact that the educational concepts which were reported as the most difficult and the most transformative by Y1 student teachers lost their influence on Y4 student teachers at both colleges, we can argue that threshold concepts are context-oriented and dynamic. Their powerful, transformational effects are not permanent as most of them do not remain influential as long as students make progress and experience other more important concepts during the course of their studies and probably during their career. Students, as discussed in the literature review, constantly evaluate what knowledge is relevant to their current context and which one is not. For example, based on the findings of ASU Y1 participants (see Table 4.9), it can be inferred that many Y1 student teachers would see mastery of academic writing more important than having knowledge of classroom management because there is no point in having classroom management knowledge if they are not required to do some training at schools. Accordingly, classroom management will be meaningless to them at that early stage in their teacher education programme. Hence, students' perceptions on which knowledge is more important and which one is less important are influenced by the context of their study and the exposure of knowledge they receive during that particular semester. Because of learners' perceptions, conceptions and orientations to knowledge, it makes sense to stress that

threshold concepts are mainly context-oriented and they depend on how long a certain context remains. Consequently, a very important point that needs to be addressed is that there is no guarantee that concepts proposed by instructors as threshold concepts will make students perceive them as threshold concepts. What is perceived of as a threshold concept by an instructor does not necessarily fit in a context where students find other concepts more relevant and more useful. Students' personal contexts cannot be isolated from their learning experiences (Beaty et al., 1997).

With their nature of being dynamic and context-oriented, it is clear that threshold concepts in any discipline cannot easily be spotted or identified by researchers and students as there are many other factors influencing students' perceptions of knowledge and learning experiences while studying a discipline. For instance, the participants in this research study reported a wide range of educational concepts as troublesome and transformative, many of which were reported only by one or two students. The reason behind students' wide range of selection of concepts could be due to the fact that their teacher education programme was jointly delivered by other academic departments such as School of Education, School of Arts, and School of Psychology. Arguably, each of these schools focused on presenting the core concepts of their subjects, and the instructors from these schools presented many concepts for students to learn, understand and study for exams. The students had to study all those subjects equally in order to pass the courses with no less than 2.00 GPA in order to avoid academic probation. Literally, students were overwhelmed with too many concepts to learn and study, which were delivered by different academic departments. Accordingly, their selection of the most important educational concepts in this study was influenced and disoriented by being

exposed to many concepts, many of which were not epistemologically and ontologically related to the development of initial teacher identity.

Moreover, the manner in which instructors present and focus on less important educational concepts is highly likely to influence and disorient students' interaction with potential threshold concepts in teacher education. For instance, the two ASU Y4 students who selected desuggestopedia as a troublesome and transformative educational concept might have thought desuggestopedia is a very important educational concept from the way their instructor presented the concept in class or tested the concept in a mid-term or final exam. Because of that, they received a misleading message with which the concept of desuggestopedia has become part of their educational belief system for forming and developing initial teacher identity. Nevertheless, when they start their careers as teachers, they will discover that desuggestopedia has no significant effect on forming and developing their teacher identity. This potential conflict between what type of educational concepts that instructors focus on in class and how student teachers actually experience those concepts when they become teachers is an area that needs more research. That is also why threshold concepts need to be implemented in the curricula of teacher education programmes.

5.4 Levels of Threshold Concepts and Layers of Difficulty

The findings of this research study have shown how difficult and challenging it is to identify threshold concepts. Even though Meyer and Land (2003) gave the example of *gravity* as a threshold concept and *core of gravity* as a core concept, they have not provided a clear-cut framework of how to precisely identify threshold concepts. The characteristics of threshold concepts can help us

identify many potential threshold concepts; however, it becomes confusing when we encounter sub concepts within a main concept as they share the same characteristics of a threshold concept. A good example drawn from this research study is the concept of teaching methods, which is a threshold concept in teacher education as the research study found. However, the concept of teaching methods includes many sub concepts such as learner-centred teaching, and these sub concepts could also have more sub concepts such as problem-solving tasks. Another example would be assessment, which consists of many sub concepts such as validity and reliability. A closer inspection of validity reveals other sub concepts such as construct validity, content validity and face validity. Arguably, although the term is quite big, we still cannot say that assessment is not an educational concept; therefore, it would remain eligible to be considered as a threshold concept as it matches the characteristics of a threshold concept. On the other hand, validity with its sub concepts could be also considered as a threshold concept since it shares the same characteristics as assessment. It would be confusing to say validity is a threshold concept, but assessment is not due to the fact that the term assessment is quite big. Drawing on the findings of her research, Orsini-Jones (2010) considers grammar as a threshold concept in language learning even though it is a much wider concept than teaching methods and assessment in teacher education. Furthermore, in a recent research study, recovery has been identified as a threshold concept in nursing (Watson, 2019), though it is a general concept like assessment. We have to say that the lack of more specific guidelines about what makes a concept a threshold concept and not a core concept reveals a weakness in the literature on threshold concepts. On the other hand, the lack of identification protocol does have some advantages, one

of which is that it invites further investigation into areas that have not received much attention. This will increase the diversity and richness of the literature about threshold concepts.

It is interesting to highlight the fact that some interviewees raised the issue of layers of difficulty regarding certain educational concepts when it comes to the theoretical knowledge of a concept and the practical knowledge of applying that concept in actual teaching. Classroom management is a good example of a threshold concept in teacher education that has two layers of difficulty as a threshold concept. Camla (interviewee 3, ASU 3) stated that it is easy to understand classroom management (theoretical knowledge) but it is difficult to apply it (practical knowledge). Another example is critical thinking which was easy for Jalal (interviewee 10 CRU 3) to use when critiquing his performance in the classroom, but was too difficult for him to use when assessing others' actions. A final example was assessment which was reported by Qamar (interviewee 17 CRU 10) as easy to understand at college but difficult to apply in the classroom, and this theoretical knowledge versus practical knowledge made her confused.

These examples show that some concepts, especially the ones related to teaching, have two-layered difficulty: the less difficult layer of the theoretical part and the more difficult layer of the practical part. The two-layered difficulty of some threshold concepts where theory and practice cannot be avoided lays the groundwork for another type of threshold concepts which can be described as skill-based concepts. Skill-based concepts are those threshold concepts where the process of understanding and crossing them requires both theoretical knowledge and practical knowledge.

5.5 Threshold Concepts or Thresholds

In a discipline such as teacher education, where knowledge and skills of teaching determine how good a teacher is, rather than pure understanding of mental representations of concepts, the findings indicate that Y4 participants were more concerned with a type of concept that requires a group of skills and abilities which will be called skill-based concepts for easy reference in this research study. The four educational threshold concepts identified in this research study (critical thinking, teaching methods, classroom management, and assessment) are conceptual pieces of knowledge, but what makes them so important and transformative (and troublesome) to the participants are the skills and abilities attached to these concepts that are used in the classroom. Pedagogically, the abilities and skills attached to these concepts are an integral part of good teaching practices, and the lack of them makes teachers too vulnerable to deliver good lessons. In this regard, having merely the knowledge of an educational concept is not enough if it is not accompanied with the practical knowledge of it.

A good example which illustrates the previous point is classroom management where the difficulty of it lies more in practising it rather than understanding it as a concept, and this may raise the question whether or not it can be considered a threshold concept. To illustrate this point, Camla (interviewee 3, ASU 3) pointed out in her interview when she reflected on classroom management as troublesome knowledge, *"I might say not too difficult to understand, too difficult to apply. The classroom management … I'm … struggling with this issue in the semester during this training*". In this quote, the student teacher raises the issue of having knowledge of the theory, but still she lacks the knowledge of practice, which does not help her to get a full grasp of

the concept despite the knowledge of knowing it. As Rowbottom (2007) argues, it appears that it is difficult to separate the knowledge of doing (ability) from the knowledge of knowing (concept) as many concepts are inherently attached to skills (see section 2.2.1). The argument presented by Rowbottom is justifiably solid especially in the field of teacher education where skill-based concepts are more important than mental representations of concepts. In fact, when we consider the other concepts on the finalised two lists of potential threshold concepts at ASU and CRU (see Table 4.19), the majority are skill-based concepts such as reflection, motivation, creativity, communicative approach, learner-centred approach and task-based approach. Therefore, the use of the term threshold concepts can cause some confusion among teachers and teacher educators when threshold concepts are presented only as mental representations. In fact, Quinlan et al. (2013) raise the same issue when they conducted their research projects on threshold concepts in engineering in three different institutions. Instead of using the term threshold concepts, they used the term thresholds in order to avoid the disputes they had faced in their project at the University of Western Australia when tutors and academics questioned the accuracy of using the term threshold concepts to describe some concepts and terms. Justifying their decision, Quinlan et al. point out, “the term *threshold concepts* was avoided, in favour of the more inclusive term ‘threshold” (p. 7). It is hardly surprising to know that the term ‘threshold’ has been widely used in the work of many researchers (Berg, Erichsen, & Hokstad, 2016; Felten, 2016; M. Flanagan, Taylor, & Meyer, 2010; Savin-Baden, 2008). In order not to restrict threshold concepts to the narrower mental representation of concepts and to include skill-based concepts, the term ‘thresholds’ is indeed more inclusive as stated by (Quinlan et al., 2013).

Some scholars of threshold concepts might argue that skill-based concepts should not be considered as threshold concepts as they are not purely mental representations; hence, researchers should stay faithful to what Meyer and Land (2003) meant by threshold concepts. This opinion can be refuted by the fact that though Meyer and Land initiated their notion of threshold concepts as a conceptual framework for transformative learning with the focus on concepts of mental representations, the theory has evolved since then to include other types of procedural and declarative knowledge along with conceptual knowledge. A quick overview of the literature on threshold concepts reveals a research study on academic numeracy in tertiary education conducted by Quinnell and Thompson (2010) in which tertiary students' knowledge of understanding and ability to perform academic numeracy were examined. Another study was carried out on the threshold concepts that are faced by PhD postgraduates when becoming researchers (Kiley & Wisker, 2010). A similar study on doctors in training becoming different doctors was investigated (Wearn et al., 2016). As for knowledge, belief and practice, a research study was carried out on in-career language teachers and student language teachers (Moroney et al., 2016). These studies did not focus only on threshold concepts as purely mental representations of knowledge, but also on the social, emotional and practical aspects when professionals experience transformational learning. We could argue here that it is the interconnectedness between conceptual knowledge and practical knowledge of a threshold concept, or a threshold, that produces the most powerful knowledge which helps learners experience epistemological and ontological shift while developing their professional identity.

5.6 Threshold Concepts as Jewels in the Curriculum

As discussed in the literature review (see sections 2.3), meaningful knowledge is not stored in our cognitive system as ‘islands of knowledge’ but as a connected framework of conceptual construction (Hattie & Yates, 2014, p. 114). Knowledge delivered to students as a whole structure of connected notions and ideas becomes more meaningful and easy to cope with, understand and process. However, it is also known that it is often quite challenging to select, organise and present knowledge in an educational curriculum as the philosophical, political, economic, and social aspects cannot be overlooked (Apple, 1993; Ball, 1993). In their attempt to improve tertiary programme curricula, (Land & Meyer, 2010, p. 75) suggest that a curriculum based on threshold concepts could help university students acquire powerful knowledge because those threshold concepts would act as the ‘jewels in the curriculum’, with which learners are going to experience transformational learning in the form of epistemological and ontological shifts in their ways of seeing themselves and the world in a different way. According to them, a programme curriculum based on threshold concepts will present meaningful knowledge that will enrich learners’ experiences. This point is supported by Perkins (2008, p. 13) who argues in favour of threshold concepts as they give more meaningful interaction with and understanding to knowledge. The findings of this research study confirm the phrase ‘jewels in the curriculum’ described by Land and Meyer (2010).

It is interesting to note that critical thinking, classroom management, teaching methods and assessment are connected. They form and work as a whole unit of connected, meaningful, conceptual and practical framework for the basis of the pedagogical component of teacher knowledge and good teaching

practices (Richards, 2001; Roberts, 1998). In fact, they represent the whole process of teaching and could be described as the pillars of effective learning. If we look at them closely and more analytically, we find out that critical thinking is the basis for planning lesson objectives, selecting appropriate lesson materials and choosing effective teaching methods to be implemented in classrooms. It is certainly the first step in preparing a good lesson as it "helps teachers to develop their critical awareness of aspects of their professional practice" (James, 2001, p. 68). Having thought critically about how the lesson should be effectively delivered, the execution of the lesson requires a classroom environment that is set up for students to receive and interact with knowledge. Without proper classroom management, it will be difficult, not only for novice teachers, but also for experienced teachers to deliver a good lesson and achieve its objectives. Managing the seating of the classroom, students' participation, the timing of activities and students' behaviours, helps teachers prepare, manage and deliver successful lessons. However, any successful lesson requires a variety of teaching methods that suit students' different styles of learning and foster the achievement of lesson objectives as teaching methods are "the actual point of contact with the students" (Cook, 1991, p. 173). Using only one teaching method usually creates a sense of boredom amongst students whose learning styles are not addressed and causes a lack of coherence when different teaching materials are presented through one teaching method. For instance, a problem-solving task presented through a lecture-type teaching method will lose its value to activate higher thinking skills if is not presented using group work. Therefore, a good selection of teaching methods is always associated with the selection of teaching materials which are based on lesson objectives. Once the lesson is carefully planned (critical

thinking), well managed (classroom management) and well delivered (teaching methods), it is time for teachers to check how effective their teaching is through assessment. Therefore, assessment is the channel through which teachers can also assess what goes well and what goes wrong when they plan, manage and deliver their lesson along with assessing the performance of their students. These four educational threshold concepts, or thresholds, are a never-ending process to improve the quality of teaching and the quality of learning.

What was discussed in the previous paragraph supports what Land and Meyer (2010) mean when they describe threshold concepts as 'jewels in the curriculum'. Furthermore, it shows why (Perkins, 2008) believes that threshold concepts are necessary for more meaningful interaction with and better understanding of knowledge. We could say that the interconnected relationship between the four educational threshold concepts is quite unique, and it really shows that they should be 'the jewels' in the curriculum of any teacher education programme.

5.7 Conclusion

This chapter presented new insightful positions related to threshold concepts and to how initial teacher identity is developed in Omani student teachers. The most important point is that the most important educational concepts in teacher education are skill-based concepts with two layers of difficulty (theoretical knowledge and practical knowledge). A further important position is that Omani students develop a language learner identity before developing an initial teacher identity. The final chapter will conclude this research study.

CHAPTER 6: CONCLUSION

6.1 Introduction

This research study investigated if there are any educational concepts that can be identified as threshold concepts in teacher education programmes at two colleges in Oman. The characteristics of threshold concepts proposed by Meyer and Land (2003) were used as the conceptual and analytical framework to identify threshold concepts in this research study. A mixed methods research design was implemented to obtain data from the Y1 student teachers and Y4 student teachers in order to answer the main research question with its sub questions:

> Do Fourth Year Omani students of English Language Teacher Education encounter any threshold concepts that impact on the development of their initial teacher identity?

- *1. What concepts are difficult and cause troublesome knowledge?*
- *2. Why do those concepts cause troublesome knowledge?*
- *3. What strategies do students use to overcome difficulty and understand those concepts?*
- *4. What concepts make students experience transformational learning?*
- *5. If there is a threshold concept, does it help develop student teachers' initial teacher identity?*

The data collection instruments consisted of a questionnaire and interview. The former was given to both Y1 and Y4 student teachers in order to obtain quantitative data which turned out to be very insightful as the findings show significant differences in the way student teachers interact with educational concepts in Y1 (language-related) and in Y4 (pedagogy-related). The

questionnaire also helped to unearth a wide range of educational concepts perceived of as troublesome and/or transformative by the participants where many of those concepts were reported only once or twice. Qualitative data were obtained from interviews with Y4 student teachers, which revealed that those participants indeed experienced troublesome knowledge and transformational learning when encountering educational concepts.

The data obtained from both Y1 and Y4 participants at the two colleges were analysed by the use of compare and contrast method as illustrated in Figure 3.1 as well as thematically. The answers of the main research question and sub questions asked in this research study will now be reported in the following sections.

6.1.1 Answers to Research Questions

This research study was carried out to answer the following research question: *Do Fourth Year Omani students of English Language Teacher Education encounter any threshold concepts that impact on the development of their initial teacher identity?*

After an exhaustive analysis of tens of educational concepts reported by 212 Y1 and Y4 student teachers in the questionnaire and comparing them with the responses of 20 Y4 interviewees, the study concludes that Omani student teachers of English do encounter and experience some educational concepts in teacher education that have impact on the development of their initial teacher identity and can be identified as threshold concepts, or thresholds. The threshold concepts identified in this research study are critical thinking, teaching methods, classroom management, and assessment. Yet, the inclusion of classroom

management as a threshold concept might be questioned by some researchers. They might argue that it is only a practice and not a skill-based concept. Nevertheless, only these four concepts were reported by Y4 student teachers at both colleges; therefore, their transformational effects on Omani student teachers are perceived and acknowledged. They are not limited to one context like the concept of reflection which was reported as a potential threshold concept at CRU, but not at ASU. The following sections provide answers to the five sub research questions.

6.1.1.1 Troublesome Knowledge in Teacher Education

The first sub research question was:

What concepts are difficult and cause troublesome knowledge?

Many educational concepts were reported as troublesome knowledge by Y1 and Y4 participants in the questionnaire. In the Y1 context, most of the troublesome knowledge was language-oriented. For instance, ASU Y1 participants expressed that grammar, academic writing and vocabulary were troublesome knowledge, whereas CRU Y1 respondents reported phonetics, English literature, academic reading, and academic writing as difficult concepts. On the other hand, the educational concepts reported by Y4 participants were pedagogy-oriented. For example, ASU Y4 participants reported pedagogy, measurement, syllabus design, classroom management and teaching methods as troublesome knowledge. Similarly, CRU Y4 expressed that teaching methods, validity, classroom management, communicative ability and critical thinking were difficult concepts, for instance.

Nevertheless, this research study used the analytical framework of threshold concepts to identify threshold concepts in teacher education and it was found

that only the concepts of critical thinking, teaching methods, classroom management and assessment identified as troublesome were qualified to be thematically explored for the phase of semi-structured interview sessions as they were also reported as having a transformative impact on the Y4 student teachers at both colleges.

6.1.1.2 Reasons for Troublesome Knowledge

The second sub research question was:

Why do those concepts cause troublesome knowledge?

As revealed in the findings of this research study, interviewees experienced critical thinking as troublesome because it is alien to them. In this particular culture, they are not familiar with being asked to think critically about what they do or what others do. Before they joined the college, the participants were not trained at schools to look at things and actions from different angles and not to take what they read and wrote for granted. It was difficult for them, as reported in the questionnaire forms and interview sessions, to go from the surface understanding to a deep meaning in order to make reasoned judgements about actions including their own. The word itself was too alien to be understood easily.

As for teaching methods and classroom management, it was the practical knowledge of applying them in the classroom that made them troublesome.

Assessment was considered troublesome because of its conceptual difficulty for two main reasons. First, student teachers found it conceptually difficult because they could not comprehend what it means for assessment to be valid and reliable in exams, for example. Second, the idea of fairness in assessment caused conceptual difficulty as students discovered that there were different

ways to assess students' performance instead of using only one assessment method.

6.1.1.3 Strategies to Overcome Troublesome Knowledge

The third sub research question was:

What strategies do students use to overcome difficulty and understand those concepts?

The most common strategies used to overcome difficulty as reported by Y1 and Y4 participants were the strategies of *Ask others to help, Ask my teachers to clarify*, *Read more about the concepts*, *Search the internet for the concepts* and *Watch educational videos*. As noticed, student teachers still largely depend on their friends, classmates and/or family members, and the influence of their teachers on understanding difficult concepts is quite big. On the other hand, very few participants use more advanced strategies such as drawing mind maps or relating concepts to real life. There are no significant differences between Y1 and Y4 students' strategies to report in this study. Almost all the students prefer the strategies of asking others to help, asking teachers to clarify, reading more about the concepts, searching the internet and watching educational videos.

6.1.1.4 Transformative Concepts in Teacher Education

The fourth sub research question was:

What concepts make students experience transformational learning?

Many different concepts were reported as transformative by Y1 and Y4 participants. They can be also grouped into two different categories: language-related transformative concepts and pedagogy-related transformative concepts. The former were mainly reported by the Y1 participants, whereas the latter were

expressed by the Y4 participants. For instance, the ASU Y1 students reported academic writing, argumentative essay, and progressive (tense) were the most transformative concepts, whereas the CRU Y1 students reported phonetics, academic reading, linguistics, grammar and academic writing as the most transformative concepts they had experienced. As for the context of Y4, the ASU Y4 participants, for example, reported behaviourism, assessment, classroom management, communicative approach, critical thinking, learner-centred approach, task-based approach as transformative concepts. Similarly, the CRU Y4 students expressed that critical thinking, assessment, reflection, creativity, teaching methods, and classroom management were some of the most transformative concepts they had experienced during their studies.

Nevertheless, only critical thinking, teaching methods, classroom management and assessment were reported as transformative concepts at both colleges; accordingly, they were identified as threshold concepts in this research study. The qualitative analysis of the interview sessions using themes confirmed and consolidated the findings of the quantitative analysis, namely the final list of potential threshold concepts in teacher education. It was found that the four potential threshold concepts, as reported by interviewees (and not mentioned by the researcher) had a huge impact on them inside and outside the classroom. For instance, critical thinking helped the student teachers see the good and bad aspects of actions and things instead of taking them for granted. Teaching methods showed them that there is no single way that suits all students' learning styles, which is similar to real life when dealing with people. Classroom management was not only for managing students in class, but also for understanding students' individual differences to deal with them effectively. As for assessment, it allowed them not to limit their judgement of students and

people to a single action or behaviour, but rather it encouraged them to make a final judgement based on a number of different encounters, actions and experiences.

6.1.1.5 Threshold Concepts and Initial Teacher Identity

The fifth sub research question was:

If there is a threshold concept, does it help develop student teachers' initial teacher identity?

Recognising and acknowledging the transformational learning those Y4 student teachers experienced with critical thinking, teaching methods, classroom management and assessment, we could argue that these threshold concepts help in the development of initial teacher identity. Drawing on the findings of Y1 and Y4 data, a transformational shift in identity of student teachers from language learners to language teachers can be seen. The linguistic and social factors cannot be ignored as many of the interviewees mentioned that acquiring English is needed first in order to become a good English teacher. The goal of mastering English was a recurring theme in their interview accounts. As English is not their mother tongue, Omani student teachers start their journey to becoming teachers of English concerned about improving their level of English proficiency. Compared to ELT student teachers whose English is their mother tongue, for instance, ELT Omani student teachers' formation of initial teacher identity focuses first on the mastery of the language. Their mastery of educational concepts will take place at later stages and not from Y1 as the findings show.

Though Omani student teachers are focused on mastering English in their first year of study, they gradually start to experience transformational learning

that triggers their development of an initial teacher identity. All of the Y4 interviewees stated that they felt they had become teachers because of the knowledge they acquired from educational concepts which gave rise to their ontological as well as epistemological shift.

Based on the findings of the data analysis and the answers to the research questions, the following sections will present a number of contributions to knowledge as well as implications for practice and further research on identifying threshold concepts in order to fill the gap in the literature on threshold concepts.

6.2 Contributions to Knowledge

6.2.1 Contribution to Knowledge: Thresholds not Threshold Concepts

As proposed by Meyer and Land (2003) threshold concepts are mainly considered to be the concepts which are grouped into the category of mental representations. Yet, the characteristics of threshold concepts could be also applied to concepts which combine mental representations and skills as the findings of this research study have shown; thus, they confirm the argument presented by Rowbottom (2007) who states, “Any given concept is supposed to be reducible to a peculiar set of abilities” (p. 265). In a discipline such as teacher education, the findings of this research have shown that educational concepts that cannot be isolated from the practical knowledge (skill) are also perceived of as troublesome and transformative by student teachers. There is no doubt that an educational concept such as teaching methods or classroom management is not merely troublesome and transformative because of its mental aspect, but rather it is due to the application part of it in classroom. As the practical knowledge cannot be separated from the conceptual knowledge in many

educational concepts, we recommend that the term ‘thresholds’ be accepted and used in the literature of threshold concepts to refer to those concepts that consist of conceptual knowledge and require practical knowledge, or skill-based concepts with two-layered difficulty. This recommendation is supported by Quinlan et al. (2013) who avoided using the term ‘threshold concepts’ in their research project and used ‘thresholds’ in order to include non-mental representations of concepts such as skill-based concepts and to avoid debate raised by teachers participating in their project.

If we reject thresholds, especially skill-based concepts, as threshold concepts, we, as teachers, educators and researchers of disciplines such as teacher education, where skills are as important as concepts, will miss the opportunity to explore in-depth the troublesome knowledge student teachers encounter and the liminal space many of them get ‘stuck’ in, and will not be able to help them experience an epistemological and ontological shift in their ways of thinking and practising. In addition, student teachers will also miss the opportunity to be reflectively exposed to troublesome knowledge, liminality and modes of variation. As the findings of the quantitative data show, many participants, especially in Y1, found it difficult to respond to the question about troublesome knowledge and many only provided with only one or two troublesome concepts, not three as requested. Those learners should not be left struggling in their study because thresholds cannot be treated as threshold concepts: the jewels in the curriculum. Moreover, the literature on threshold concepts, or thresholds, should not be deprived of a significant portion of research carried out on thresholds which can add to and enrich the increasing body of threshold concepts, or thresholds.

6.2.2 Contribution to knowledge: Research Identifying Threshold Concepts

The current research study has made a contribution to the approaches and methods that have been used to identify threshold concepts. It has demonstrated that the incorporation of a questionnaire has been an appropriate instrument to enrich the research methodology of threshold concepts and it has produced insightful findings. Incorporating questionnaire items which ask students to state concepts they perceive of as troublesome and transformative rather than providing a list of concepts proposed by teachers, course designers, and/or researchers has also been an effective strategy to reduce bias. In contrast, many studies that aim to identify threshold concepts are exclusively based on interviews and target selected concepts which are not proposed by participants in the first place. If a mixed methods approach had not been used in this research, we would not have become aware of the wide range of educational concepts which student teachers experienced as troublesome and transformative. Indeed, the use of questionnaire helped enable Y1 and Y4 participants to express their inner thoughts, keeping the influence of the researcher's assumptions to a minimum.

In addition, the crucial difference between the types of educational concepts as experienced by Y1 student teachers (mainly language-related concepts) and Y4 student teachers (mainly pedagogy-related concepts) reveals that threshold concepts are dynamic and context-oriented. Concepts perceived of by Y1 students as the most troublesome and transformative do not necessarily remain so. When students make progress in their studies, as revealed by Y4 participants, they encounter and interact with other advanced concepts, which they deem to be more troublesome and more transformative. In addition, many threshold concepts in a discipline such as teacher education consist of two

dimensions, namely theoretical knowledge and practical knowledge which are inseparable. It is not enough for student teachers to acquire the theoretical knowledge of a concept like classroom management, for instance, while they lack the practical knowledge of applying it in a real situation. Without the practical knowledge, theoretical crossing of a skill-based threshold (the term used in this study to describe a threshold concept that requires practical knowledge) becomes ineffective and keeps student teachers 'stuck' in the liminal space.

6.2.3 Contributions to Knowledge: Troublesome Knowledge

Perkins (2006), as discussed in section 2.2.1.1, categorises troublesome knowledge into five types: ritual, inert, alien, conceptually difficult and tacit. Based on the findings of this research study, it can be concluded that the troublesome knowledge of critical thinking and assessment fall under alien knowledge and conceptually difficult knowledge respectively. As for the troublesome knowledge of teaching methods and classroom management, it appears that they cannot be categorised as ritual, inert, alien, conceptually difficult, or tacit. However, they can be described as practically difficult, thereby supporting the argument for having skill-based concepts that have two-layered difficulty (theoretical knowledge and practical knowledge).

It can be argued that Perkins' types of troublesome knowledge focus mainly on conceptual knowledge, or mental representations of concepts. However, since we have identified thresholds, or skill-based concepts with two-layered difficulty, we suggest we add (practically difficult) to the types of troublesome knowledge.

6.2.4 Contribution to Knowledge: Development of Initial Teacher Identity

One of the most significant insights generated by this research study is that the potential threshold concepts identified by student teachers appear to change and be replaced by other concepts during the course of their studies. Y1 student teachers in this study see themselves predominately as language users rather than language teachers; therefore, most of the concepts experienced as troublesome and transformative are language-related concepts such as grammar, academic writing and phonetics. On the other hand, Y4 student teachers, who are about to graduate and have been exposed to advanced concepts, appear to see themselves as language teachers; therefore, they are more interested in or concerned about pedagogy-related concepts. The perceptions of knowledge and learning orientations of the two groups of student teachers are different; thus, their interaction with knowledge is different. Arguably, students' perceptions of knowledge and learning orientations play a vital role in their interactions with concepts and in determining which concepts are seen as the most important ones. We could point out that a development of initial teacher identity in the Omani context of ELT gradually takes place after student teachers feel more competent in mastering the English language. In other words, mastering English is the first priority which paves the way for developing an initial teacher identity at later stages when Omani student teachers of English feel more comfortable and more confident in using the language. In short, the linguistic influence (identity of language learner) prevails in Y1 but it is taken over by the pedagogical influence (identity of teacher) as student teachers progress in their studies.

6.3 Implications for Practice and Future Research

6.3.1 Implications for Future Research: Identifying Threshold Concepts

The findings of this research study have revealed two different groups of thresholds experienced by Y1 and Y4 student teachers. We could presume that Y2 and Y3 students might experience other different thresholds based on the discovery that thresholds are context-oriented. The dynamic experiences with thresholds across the years of study involve new concepts which replace most of the prior ones as students make progress and experience more advanced concepts in Y4 courses, which help shape their initial teacher identity.

Therefore, a more reliable approach to identifying threshold concepts would be a mixed methods approach which compares and contrasts potential threshold concepts as perceived of by learners in their first year, second year, third year and fourth year of study. In this case, a concept that is expressed in Y1 as a threshold and remains across the years of study until Y4 would be a powerful threshold involving the most powerful transformational learning experienced by learners. Along with a mixed methods research design, a longitudinal study on students starting Y1 and progressing to Y2, Y3 and Y4 is also recommended as a method of providing the most reliable research on threshold concepts. It could explore the areas of troublesome and transformative knowledge, the liminal space and modes of variation in a more coherent and meaningful way. Furthermore, it could enable a better understanding of the other characteristics of thresholds like integrative, discursive and reconstitutive as a longitudinal mixed methods research study would provide a wider context in which to investigate their interconnected relationships as a whole. In addition, longitudinal mixed methods research would provide a conceptually collective framework of thresholds in a particular

discipline with more coherent and more meaningful insights into the dynamic interaction between learners' conceptions of knowledge, construction of knowledge, orientations to learning and formation of initial professional identity. Moreover, longitudinal research will lead to a better understanding of the effects of liminal space and the modes of variation that learners experience over time. An extended investigation into the development of thresholds over four years of study will also enable teachers, course designers and researchers to better understand of the gradual epistemological and ontological shift in students' initial professional identity as such transformational learning starts to take shape in Y1. We could argue that conducting research to identify thresholds or threshold concepts in only one year of study is limited and does not give us the whole picture of how threshold concepts work in a discipline.

6.3.2 Implications for Practice: Thresholds in the Curriculum of Teacher Education programme

Threshold concepts are 'the jewels in the curriculum' as they present the subject matter of a discipline in a more meaningful way and create more coherent ways of thinking and practising (Davies, 2006; Meyer & Land, 2006). As discussed in section 5.6, there is a connected conceptual and practical framework among the four thresholds which were identified as threshold concepts in this study (critical thinking, teaching methods, classroom management, and assessment) and acquiring them creates more coherent ways of thinking and practising. These four thresholds, or threshold concepts, in teacher education as perceived of by Y4 student teachers are not the only thresholds as there will be others in the different years of study programmes and different contexts. Therefore, if we want to design and implement a thresholds-based curriculum in teacher

education, we recommend that teachers, course designers and researchers along with the contributions of students themselves identify threshold concepts across the years of the study programme and include them in the curriculum as the most important concepts to be taught and assessed. There appears to be no benefit in overwhelming students with large numbers of educational concepts as this may lead to threshold concepts being overlooked and student teachers not experiencing transformation in their epistemological and ontological belief systems. Consequently, the purpose of teacher education with regard to the development of initial teacher identity cannot be achieved.

Therefore, we recommend that thresholds in a thresholds-based curriculum should be stratified and graded into categories based on the results of longitudinal mixed methods research into identifying thresholds. The stratification of knowledge based on learners' true experiences with thresholds or threshold concepts will be more coherent and more meaningful. Hence, a comprehensive thresholds-based curriculum where thresholds, or threshold concepts, are identified, classified and presented in the subjects of every year of the study programme will create a more meaningful context in which to acquire knowledge when it is taught, learned and assessed. Furthermore, it will foster the experience of the transformation of epistemological and ontological shift where the development of an initial teacher identity will be addressed. Acquiring knowledge will be more meaningful and assessing students' learning progress will be more purposeful and oriented to teacher identity. This will not take place unless the main focus of assessment is on thresholds and is removed from educational concepts that have no transformational effect on students. Assessment oriented on thresholds will be a tool for providing meaningful interaction with knowledge, consolidating the acquisition of powerful knowledge

and enhancing transformational learning. Yet, we have to emphasise that teaching and assessing the basic and core concepts of subjects should not be totally ignored in a threshold-based curriculum as they are the foundations of any discipline, and in teacher education programmes it is from them that learners start their journey to develop their initial professional identities: initial teacher identity in our context.

6.3.3 Implications for Practice: Supporting Student Teachers to Develop Teacher Identity

This research study has revealed that Omani student teachers start their journey to become teachers of the English language feeling very concerned about developing their linguistic proficiency before starting to develop initial teacher identity. This kind of concern implies that we, as instructors or teacher educators, should not overlook student teachers' identity as language learners if we want them to develop an initial teacher identity at a later stage. Both identities cannot be separated from each other in the Omani context as was revealed by the many Y4 interviewees who addressed the importance of mastering English language as one of the characteristics of a good teacher.

Yet, it is known that student teachers do not go to teacher education colleges with zero knowledge of what it means to be a teacher. From their observations as students at schools, they have created a set of perceptions of, beliefs in and attitudes to teaching (Malderez et al., 2007; Roberts, 1998). Therefore, indirect exposure to the development of initial teacher identity is needed in the early stages of the Omani ELT teacher education programmes. Student teachers should be made aware of and should be encouraged to develop an initial teacher identity from the beginning of their programme, which

will enable them later to make more sense of their journey to becoming teachers. In order to develop initial teacher identity, regular school visits with the aim of observation should be arranged from the first year of the teacher education programme in order to allow student teachers to feel that they are becoming teachers and to assist in developing an initial teacher identity. In addition, the practicum course(s) should be started in Y3 with co-teaching alongside with the class teachers first before advancing to full teaching sessions in Y4. This will enable student teachers to have more time to reflect on and have better critical thinking of their performance in terms of teaching methods, classroom management, and assessment: the four educational concepts that have been identified as thresholds in this research study.

6.4 Limitations to the Study

There are some limitations which are related to the design and methodology of this research study. Initial plans for the design of the study had included attempts to triangulate the data. However, lack of existing relationships and communication with the instructors, travel distance and time constraints eventually prevented such triangulation. Focus group with academics and documentary analysis, as proposed by (Cousin, 2009) in her transactional curriculum inquiry to identifying threshold concepts, could have further enhanced the findings. Such an analysis would have provided additional insight into the reasons why participants in both Y1 and Y4 at both colleges experienced a wide range of educational concepts that were perceived of as troublesome and/or transformative. Documents such as syllabi, study plans and course materials could have helped us understand what and how the educational concepts were delivered at both colleges. Moreover, a look at the

assessment documents such as projects, quizzes and final exams, could also have provided information about the types of educational concepts the students were tested on.

Due to the research design, another limitation is the exclusion of some important educational concepts such as reflection which was reported as troublesome and transformative by CRU Y4 participants but not by ASU Y4 participants. Accordingly, it was not added to the final list of potential threshold concepts. However, some of the interviewees mentioned reflection as a very influential concept that had transformed the way they saw themselves and the world in a different way. A more flexible research design could have allowed other important educational concepts to be identified as thresholds in this study.

The benefits of not providing participants with a list of predetermined potential threshold concepts in teacher education to choose from have already been discussed. Nevertheless, such a list, if based on the analysis of relevant documents as mentioned above, would have eliminated less important educational concepts such as desuggestopedia and would have enabled the focus to be on a smaller range of potential threshold concepts in teacher education.

In addition, the study could have been enhanced by incorporating follow-up sessions with interviewees. As it stands, the interview sessions were conducted before the analysis of the questionnaires had been concluded. The rationale behind this research design choice was to avoid or minimise researcher's bias and obtain participants' narratives as authentically as possible. However, a follow-up session after data analysis would have enabled interviewees to elaborate on their previous responses in more detail. This applied particularly to the liminal space discussion, which could have been addressed more

comprehensively. If follow-up interview sessions had been incorporated, additional findings could have been made to strengthen the results of this research study.

6.5 Conclusion

Reflecting on the whole experience of undertaking this research study in terms of using mixed methods research design, analysing data, thinking of implications and being aware of limitations, we could conclude that a more rigorous way to gather data in order to identify threshold concepts, or thresholds, would be to include a focus group with academics, documentary analysis, questionnaire, interview with students, and follow-up interview session for the reasons which have been discussed in the previous sections.

A fresh perspective on the nature of threshold concepts and how they can be identified has been presented and it is hoped that through this research study more research in this area will be encouraged. For instance, a study identifying threshold concepts, or thresholds, across the years of a degree programme could offer more insights than a few predetermined threshold concepts restricted to a single cohort of students like Y1 learners. Having the knowledge of threshold concepts across continuous years of a study programme will enable the design of more coherent, relevant and meaningful curricula, where powerful knowledge could be rationally selected, arranged and presented in a more meaningfully connected context. Furthermore, it will assist in the creation of a comprehensive framework in order to improve the quality of teaching and learning and provide students with an authentic experience of interacting with powerful knowledge that will foster epistemological and ontological shift in their

initial professional identities such as an initial teacher identity in the context of this research study.

Finally, this research study, from a personal perspective, has been like a threshold concept, where I have experienced liminality and the modes of variation: starting from a preliminal space, getting stuck and going through a liminal space, arriving at a postliminal space and hopefully going to a subliminal space. Moreover, I have lived and experienced the liminal spaces of those ASU and CRU student teachers, and this has completely changed the way I looked at them as objects in the beginning of my research study. As Felten (2016) argues in favour of addressing the importance of students' voices when identifying threshold concepts, or thresholds, I have become aware that students should have more active roles in the process of identifying threshold concepts. Indeed, they should be treated as partners, not objects, as Felten emphasises, in the literature of investigating threshold concepts, or thresholds. To conclude, if there is one word to describe the whole experience, I would say that I have experienced an epistemological and ontological shift in the way I look at the world and myself at a professional and personal level.

Appendix A: A Study Plan at ASU and CRU

ASU Study Plan

FIRST YEAR					
SEMESTER ONE		**Cr. H**	**SEMESTER TWO**		**Cr. H**
****	Writing Skills 1	3	****	Computer Skills	2
****	Elective 1	2	****	Research Method	1
****	Elective 2	2	****	Vocabulary & Reading 2	3
****	Language Skills 1	3	****	Language Skills 2	3
****	Vocabulary & Reading 1	3	****	Foundations of Education	3
****	Arabic Language	3	****	Writing 2	3
TOTAL		**16**	**TOTAL**		**15**
SECOND YEAR					
SEMESTER THREE		**Cr. H**	**SEMESTER FOUR**		**Cr. H**
****	English Literature 1	3	****	English Literature 2	3
****	Study of Language & Phonetics	3	****	Critical Reading	3
****	Modern English Grammar	3	****	Effective Writing	3
****	Effective Reading	3	****	Phonology & Morphology	3
****	Educational Aims	3	****	Educational Psychology	3
****	Modern Omani Society	1	****	Islamic Civilization	2
TOTAL		**16**	**TOTAL**		**17**
THIRD YEAR					
SEMESTER FIVE		**Cr. H**	**SEMESTER SIX**		**Cr. H**
****	Speaking Skill	3	****	Translation Skills	3
****	Language Syntax and Semantics	3	****	Methods of Teaching English 1	3
****	Academic Writing	3	****	Research Project	3
****	Educational Technology	3	****	Educational Curriculum	3
****	Children's Literature	3	****	Elective 1	2
****	Counselling and Development	3	****	Elective 3	2
TOTAL		**18**	**TOTAL**		**16**
FOURTH YEAR					
SEMESTER SEVEN		**Cr. H**	**SEMESTER EIGHT**		**Cr. H**
****	Educational System in Oman	3	****	Teaching Practice (Practicum)	9
****	Studies in Fiction	3	****	Measurement and Evaluation in Education	3
****	Power of Language in Society	3	****	Applied Linguistics	3
****	Language Acquisition	3	****	**********	
****	Methods of Teaching English 2	3	****	**********	
****	Elective 2	2	****	**********	
TOTAL		**17**	**TOTAL**		**17**

CRU Study Plan

FIRST YEAR					
SEMESTER ONE		**Cr. H**	**SEMESTER TWO**		**Cr. H**
****	Introduction to Phonetics and Phonology	3	****	Applied Linguistics	3
****	Computer Skills 1	2	****	English Grammar and Usage II	3
****	Advanced Writing Skill 1	3	****	Computer Skills 2	2
****	Listening & Speaking	3	****	Advanced Writing Skill 2	3
****	English Grammar and Usage 2	3	****	English Literature I	3
****	Advanced Vocabulary & Reading	3	****	Foundations of Education	3
TOTAL		**17**	**TOTAL**		**17**
SECOND YEAR					
SEMESTER THREE		**Cr. H**	**SEMESTER FOUR**		**Cr. H**
****	Arabic Language Skills	2	****	Grammar & Vocabulary Skills	3
****	Introduction to Educational Psychology	2	****	English Literature for Children	3
****	Reading in Applied Linguistics	3	****	History of Oman	2
****	Reading & Writing Skills	3	****	Language Structural Semantics & Syntax	3
****	Lexical Semantics & Morphology	3	****	ELT Methods of Teaching	3
****	Islamic Culture	2	****	IT Technology for Educational Purposes	3
****	Report Writing	2	****	**********	
TOTAL		**17**	**TOTAL**		**17**
THIRD YEAR					
SEMESTER FIVE		**Cr. H**	**SEMESTER SIX**		**Cr. H**
****	Introduction to Assessment	3	****	Development of Oral/Aural Language Skills	3
****	Advanced Listening Comprehension	2	****	Psychology of Language	2
****	Art of Creative Writing		****	Language in Society	
****	Debating and Communication		****	Discourse Analysis	
****	Teaching Practice 1 (Practicum 1)	3	****	Introduction to Language Acquisition	3
****	School Management	2	****	Developmental Psychology	3
****	Error Analysis & Correction	3	****	Teaching Practice 2 (Practicum 2)	3
****	ELT School Curriculum Analysis	2	****	Research in the Classroom	3
****	Development of Initial Literacy Skills	3	****	**********	
TOTAL		**18**	**TOTAL**		**17**
FOURTH YEAR					
SEMESTER SEVEN		**Cr. H**	**SEMESTER EIGHT**		**Cr. H**
****	Translation Skills and Techniques	3	****	Research Methodology	2
****	Language through Stories	3	****	Learning & Independent Learning	3
****	Communicative language Teaching	3	****	Language through the Art	3
****	Literature around the World	2	****	Teaching Practice 4 (Practicum 4)	5
****	English Literature 2		****	**********	
****	Contemporary Literature		****	**********	
****	Teaching Practice 3 (Practicum 3)	5	****	**********	
TOTAL		**16**	**TOTAL**		**13**

Appendix B: Declaration of Informed Consent

Declaration of Informed Consent

As explained clearly by the researcher, this study requires participants on their own free will to participate in questionnaire or audio-recorded interview in order to collect data. Therefore, I am totally aware of the following points:

- I agree to participate in this study, the purpose of which is is to identify any threshold concepts in teacher education and their influence on students developing their teacher identity.
- I have read the participant information sheet and understand the information provided.
- I have been informed that I may decline to answer any questions or withdraw from the study without penalty of any kind.
- I have been informed that all of my responses will be kept confidential and secure, and that I will not be identified in any report or other publication resulting from this research.
- I have been informed that the investigator will answer any questions regarding the study and its procedures. Marwan AL-Yafaei, School of Education, Durham University can be contacted via email: (m.a.al-yafaei@durham.ac.uk) or by telephone at 99892323.
- I will be provided with a copy of this form for my records.

Any concerns about this study should be addressed to the School of Education Ethics Sub-Committee, Durham University via email (ed.ethics@durham.ac.uk).

_____

Date Participant Name (please print) Participant Signature

I certify that I have presented the above information to the participant and secured his or her consent.

_____

Date Signature of Investigator

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Durham University is the trading name of the University of Durham

Appendix C: Questionnaire for Year 1 and Year 4 Students

Dear Student,

I am currently working on my Ed.D (Doctorate of Education) degree at Durham University, UK. My research data collection is questionnaire. The purpose of this questionnaire is to get data about your beliefs and attitudes to becoming teachers which I will only use in my study.

The questionnaire is divided into four parts. The first part gives the definition of two important key words. As for Part 2, it asks you some general information. The third part consists of a 11-statement Likert scale which asks you to show your opinion (1 strongly disagree up to 7 strongly agree) by ticking the appropriate box. Finally Part 4 has three open-ended questions asking for slightly longer written responses. Your responses are only used for research purposes, and they will never be revealed to a third party. As your identity will remain anonymous, please do not write your name on the questionnaire.

Your contribution to the research is highly appreciated and valued.

Thank you very much for your help.

Best regards,

Marwan Alyafaee

Ed.D Postgraduate Researcher

Durham University, UK

2018

PART 1: Key Vocabulary

1. Concept:

- An abstract **idea** or **notion** that is known by specific features / characteristics and determines the application of a term (Oxford Dictionary).

Example 1: Algebra is an essential concept in Maths.

Example 2: Beauty is a concept that has different meanings in different cultures.

2. Knowledge:

- Facts, information and skills acquired through experience or education, the theoretical or practical understanding of a subject (Oxford Dictionary).

Example 1: Teaching a subject requires a lot of knowledge in the subject itself.

Example 2: Students go to university to gain more knowledge on different specialisations.

PART 2: General Information

Put a tick in the correct box.

1. Academic Institution: Sultan Qaboos University ☐
   Rustaq College of Education ☐

2. Gender: Male ☐
   Female ☐

3. Age: 18-19 ☐ 20-21 ☐ 22-23 ☐ 24+ ☐

4. Year of Study: Year 1 ☐
   Year 4+ ☐

5. Semester: Autumn/One ☐
   Spring/Two ☐

PART 3: Awareness to TC

Q1. Please read the following statements carefully and give your opinion based on your experience by ticking the appropriate box (1 Strongly disagree, 2 Disagree, 3 Fairly disagree, 4 No opinion, 5 Fairly agree, 6 Agree and 7 Strongly agree).

	Characteristics of TC	**1 strongly dis-agree**	**2 dis-agree**	**3 fairly dis-agree**	**4 no opinion**	**5 fairly agree**	**6 agree**	**7 strongly agree**
*1-Trb+	I think most of the concepts I learned in teacher education programme were easy to understand.							
2 Trb+	I have faced a lot of problems with understanding some difficult concepts.							
3 Trb+	I got 'stuck' when I was unable to understand some difficult concepts.							
4 Trb	Some difficult concepts have made me study harder.							
*5-Trf+	I learned many educational concepts, but I have not experienced any change in the way I think.							
6 Trf+	After understanding some concepts, I felt I was like a teacher.							
7 Trf	Some concepts have shown me that teaching needs a higher level of thinking.							
8 Trf	Some concepts have changed the way in which I see the world.							
*9 Irr	I still remember the difficult concepts which I have already understood.							
*10 Int	Some concepts have helped me understand other concepts that were difficult in the beginning.							
*11 disc	After understanding some concepts, I became able to clearly express my ideas in class discussion.							

PART 4: TC

Q1. What are the three most difficult concepts you have faced in your teacher education programme? Why did you find them difficult? **Please write your answers in the box below.**

Difficult Concept	**Why is it difficult?**
1. ……	…… …… ……
2. ……	…….. …… ……
3. ……	…….. …….. ……..

Q2. What strategies did you use to overcome these difficulties and understand these concepts?

1._____

2._____

3._____

Q3. Have you come across any concepts in your teacher education programme which, once understood, had a huge impact on your life? Please list up to three concepts, **using single words or short phrases.**

1. _____

2. _____

3. _____

- Thank you –

Appendix D: Interview with Y4 Students

Dear Student,

I am currently working on my Ed.D (Doctorate of Education) degree at Durham University, UK. My research data collection is interview with Y4 student teachers. The purpose of this interview is to get data about some educational concepts you have faced in your teacher education programme which I will only use in my study.

The interview has 13 questions. You have the right not to answer all of them. Your responses are only used for research purposes, and they will never be revealed to a third party. As your identity will remain anonymous, please make sure you have carefully read and signed the declaration of informed consent. Your contribution to the research is highly appreciated and valued.
Thank you very much for your help.

Best regards,

Marwan Alyafaei
Ed.D Postgraduate Researcher
Durham University, UK
2018

Academic Institution: _____

Interview: _____

PART 1: General Information

Interview date: _____

Interview Start: _____

Interview Finish: _____

Place of Interview: _____

1. Gender: ☐ Male ☐ Female

2. Age: ☐ 22-23 ☐ 24-25+

PART 2: Interview Questions

Q1. My first question: Why do you want to be a teacher?

Q2. In your opinion, what are the main characteristics of a 'good' teacher?

Q3. What knowledge do you think you need to acquire in order to become a teacher?

Q4. Now can you tell me a little bit about the content of your course? I am particularly interested in the key educational concepts and ideas you have learned.

Q5. Amongst these concepts, have there been any specific ones which have been particularly difficult, that you really struggled with and found extremely hard to understand? Which ones were they?

Q6. The difficult concepts you've just mentioned, why did you find them the most difficult ones? I mean why were they too difficult?

Q7+. What strategies did you use to overcome these difficulties and understand these concepts?

Q8. Are there still any educational concepts you still find them too difficult to understand? What are they?

Q9+. How will you try to overcome these difficulties and understand these concepts?

Q10. Amongst all the educational concepts you have mentioned in this interview, have there been any specific ones that have fundamentally changed the way in which you see the world and yourself? Which ones were they?

Q11. Could you give me some examples of how these concepts have helped you see the world and yourself in a different way?

Q12. Do you feel that the educational concepts which had great influence on you have helped you acquire some qualities of being a teacher? Could you give me some examples?

*Q13. As being a teacher, what makes you different from other people?
(* I only ask Q13 when the student makes it clear he or she feels like a teacher in their response to Q12.)

Thank you

Field Notes

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