Managing the Complexities of English Language Teaching in Engineering

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Abstract

In this 21st century, engineering employers seek professional engineers who have excellent scientific knowledge and are able to demonstrate good communication and problem solving skills. With this focus on job demands, engineering education has been restructured, balancing the emphasis between scientific knowledge and soft skills. This shift in focus has not only affected the teaching and learning in engineering education, but also English Language (EL) educators who are involved in teaching non-technical components within an engineering education curriculum.

This shift in focus has raised the demand for ESP which include teaching communication skills in English language discourse used in engineering, and teaching problem solving skills in English language teaching. With this demand, challenges are inevitable among EL educators who are generally prepared for teaching English for generic purposes in school settings and who bring with them pedagogical knowledge and beliefs in English language teaching, as well as identities they have developed from their previous to their new workplace. This shift also raises questions about the ways in which English language teaching is positioned, the role of English language courses within an engineering-specific context and the implications of this positioning on the design of the English language courses.

The main aim of this study was to investigate how EL educators managed the complexities in teaching English at one technical university in Malaysia. In addressing the research questions, a case study design was developed to highlight the complexities within that context and the ways in which EL educators managed these complexities. The data for this study were collected through qualitative and quantitative methods to unpack the complex process of teaching English for engineering which included teaching problem solving and communication skills. These methods obtained insights into the ways in which EL educators conceptualised English language teaching, positioned themselves and framed their teaching in an engineering context. The quantitative data were collected through a questionnaire involving 12 EL educators. The data from the questionnaire were used to profile the EL educators at the English Language Department of this university. Based on the profiling, four EL educators teaching undergraduate engineering students were selected for the main study. The qualitative data were collected through document study, individual semi-structured interviews, classroom observations, video recording of classroom observations and stimulated recall protocols.

This study found that there were disconnections between English language teaching and the engineering discipline at this university. These disconnections were due to the dissemination process of the engineering accreditation requirements whereby these requirements went through
multiple layers of interpretation, adaptation and translation before they reached the EL educators, causing ambiguities in positioning English language teaching and misalignments in the role of the English language courses within the engineering academic curriculum. As a result, tensions occurred in determining the emphasis of English language teaching.

The ambiguities in positioning English language teaching and the misalignments of the English language courses presented the EL educators with challenges in managing their pedagogies and framing their teaching within the context of an engineering university. The study found that the strategies that the EL educators exercised in their agency resulted from the interplay between how they positioned English language teaching and the professional identities they developed in their university context. The demand for ESP required these EL educators to teach beyond their expertise, creating challenges for them to establish their professional identities. Complexities emerged when English language teaching involved integration among English language, communication skills, engineering knowledge, and problem solving skills.

This study contributed to the field of English language teaching, specifically to English for Specific Purposes (ESP) by providing knowledge and understanding of the complexities of teaching English for the engineering discipline in higher education. It also contributed to research on professional identities by highlighting the tensions, struggles and negotiations that EL educators faced in positioning themselves within this context to determine their professional identities. The findings of this study deepen our knowledge and understanding of professional identities and agency among EL educators in the Malaysian context, particularly in the discipline-specific context of engineering.
Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

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Contributions by others to the thesis

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<td>Accreditation Board for Engineering and Technology</td>
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<td>BEM</td>
<td>Board of Engineers Malaysia</td>
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<td>CLO</td>
<td>Course learning outcomes</td>
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<td>EAC</td>
<td>Engineering Accrediation Council</td>
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<td>English language teaching</td>
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Chapter 1  Introduction

This study investigated the experiences of EL educators in managing the complexities of teaching English within the discipline of engineering at one technical university in Malaysia. This chapter provides the background to the study by first exploring English language teaching for specific purposes. Next, the chapter discusses the changing job market demands, particularly in engineering industries, and the impacts of these changes on engineering accreditation requirements and engineering education. The discussion of the impacts of the changing job market demands in engineering industries provides an understanding of how these changes create pressure on English language teaching within the context of engineering disciplines.

This introductory chapter, therefore, establishes the focus of the investigations and the key questions that this study sought to address and the significant contribution that this study makes to the field of English language teaching in engineering in higher education. The chapter concludes by outlining the structure of this thesis.

1.1 English Language Teaching for Specific Purposes

Globalisation has elevated the need for English language as the medium of global interactions in various industries such as in business and science. Within these contexts, professionals are involved in various types of communication including writing letters and emails, telephone and face to face discussions with individuals locally and overseas. Given these activities, employers require their employees to be able to interact in English within the context of the discipline they work in. Thus, English language teaching in higher education contexts needs to provide a language learning environment which reflects language use in workplace contexts. This calls for English language teaching to change its focus from teaching grammatical and linguistic aspects to teaching English for specific purposes and for specific disciplines (Bhatia, 2007; Basturkmen, 2010).

The main aim of ESP courses is to develop learners’ communicative competence in English within a specific discipline or professional area (Alexander, 2013; Hyland, 2003, 2007). With the need for a future workforce to be able to communicate within a specific discipline, ESP courses are expected to provide specialised English language discourses for specific disciplines. In other words, these courses provide opportunities for students to learn English in meaningful contexts, where the focus is more on vocabulary and language contexts rather than on grammar and language structures. Thus, English language teaching within such a discipline-based context includes teaching
communication skills and contents of a discipline as well as the language itself. The multifaceted nature of teaching English for specific purposes creates challenging roles for English language (EL) educators to play in equipping the future workforce with exceptional English language abilities and communication skills within a particular discipline that these EL educators may not be expert in.

In addressing the demand for English in various industries, English language teaching for specific purposes has been growing in many non-English speaking countries such as Japan, Taiwan and Nigeria, since the 1990’s (Hou, 2013; Shi, 2013; Umera-Okeke & Okeke, 2014). Continuous research has been conducted to determine the language needs of various industries and to what extent ESP programmes in non-English speaking countries have addressed English for global interactions in the workplace. Malaysia is an example of how this shift from a linguistics focus to a language in content discipline focus is taking place.

1.1.1 English for specific purposes in the Malaysian context

Teaching English for Specific Purposes (ESP) has been a trend in English language teaching in higher education in Malaysia since the 1990s (Abdullah, 2001). For ESP to be effective, students are required to have a good command of English to enable them to learn the specialised language (Evans & Morrison, 2011). In science and technical fields such as engineering, however, it was found that Malaysian undergraduates have limited proficiency level in English, making it challenging for English language teaching to be contextualised into engineering fields (Musa, 2002; Rafee, Mustafa, Shahabuddin, Razali, & Hassan, 2012; Sidhu & Kaur, 2011). In teaching ESP, the educators are generally of English as a second language (ESL) background (Mustapha & Yahya, 2013). These educators are well-equipped with linguistic knowledge and the pedagogies for teaching the language. However, they may lack understanding about language in a workplace or a discipline. Thus, the concept of ESP may not be well understood by them.

In addition, English language educators need to be informed about the language demands of specific disciplines, for example in engineering industries. However, they may not come from engineering backgrounds and thus, may not understand their students’ language needs for engineering effectively. With limited understanding of the nature of ESP, as well as knowledge about the language demands in engineering, EL educators may perceive their role only as language educators (Tan, 2011). As a result, the abilities to interact in English within a particular discipline or in a workplace may be problematic.
1.2 The Changing Job Market Demands in Engineering Industries

In the 21st century, the engineering profession demands excellent scientific knowledge and soft skills such as communication and problem solving to cope effectively with the work demands in their fields. This means that, employers no longer seek candidates who only display high academic achievements. Instead, they seek candidates who are able to apply knowledge and demonstrate skills relevant for a workplace in a particular field. Communicating clearly and accurately, and working effectively as a team are crucial in today’s competitive and challenging engineering industries. Having strong communication skills is important to build trust among team members and is a great advantage in securing employment (Zaugg & Davies, 2013). In addition, there is also a great demand for future engineers to demonstrate abilities to solve problems to secure employment in engineering fields (Yusoff, Omar, Zaharim, Mohamed, & Muhamad, 2012; Talbot et al., 2013; Varwandkar & Deshmukh, 2013). For example, in one survey conducted with employers in the engineering industry in the USA, it was found that 60% of employers ranked communication as the most essential skill while 55% ranked problem solving as the second most essential skill (Nicometo, Anderson, Nathans-Kelly, Courter, & McGlamery, 2010).

English has, undeniably, been acknowledged as the global language for communication in the engineering industry (Riemer, 2007). Thus, the increasing use of English as the medium of instruction and interaction at tertiary level in Malaysia has been inevitable. In Malaysia, English maintains second language status and in higher education English is the medium of instruction (EMI) for teaching and learning in science and technology courses, including engineering. Consequently, efforts towards developing communicative abilities of future engineers are not only focused on teaching communication skills but also on teaching the English language.

The need for problem solving skills in engineering is also critical. These skills are not only important for engineers to function effectively in the workplace, but also to cope with unpredictable circumstances throughout their careers (Heylen, Smet, Buelens, & Vander Sloten, 2007; Mourtos, Okamoto, & Rhee, 2004b; Tong, 2003; Wye & Lim, 2009). Despite efforts to develop these skills, the engineering industry remains dissatisfied with the abilities engineering graduates demonstrate in this area (Varwandkar & Deshmukh, 2013). Furthermore, studies have highlighted that there are deficiencies in engineering graduates’ communication and problem solving skills (CBI The Voice of Business, 2012; Male, Bush, & Chapman, 2010).

The situation in Malaysia reflects a change in job demands and the impact of this on engineering education is worldwide (ABET, 2007, 2010b; Bradley, 2011; Engineering Accreditation Council, 2007). The increasing need for communication (in English) and problem
solving skills in the engineering field has led engineering accreditation criteria both in Malaysia and overseas to be revised to support the development of communication and problem solving skills (ABET, 2007, 2010b; Bradley, 2010; Engineering Accreditation Council, 2007). As engineering programmes need to comply with these criteria to be accredited, these accreditation criteria impact greatly on the development of engineering education.

1.2.1 The impact on engineering accreditation requirements

Currently, engineering programmes in many countries are required to undergo accreditation processes to ensure that the programmes offered by universities and the engineering graduates produced meet the expectations of engineering professional bodies (Prados, Peterson, & Lattuca, 2005). Furthermore, engineering graduates can only practice engineering if they have achieved Chartered Engineer status (Powell, Bagilhole, Dainty, & Neale, 2004). This can only be achieved if engineering graduates have obtained an engineering degree from an accredited engineering programme.

In the United States, the agency responsible for the accreditation process is the Accreditation Board for Engineering and Technology (ABET). In 1997, ABET developed the Engineering Criteria 2000 (EC2000) to address industrial demands for employability skills which included communication and problem solving skills (ABET, 2010b). The EC2000 described the graduate outcomes that engineering students need to achieve at the end of an engineering programme. These graduate outcomes are presented in Table 1-1 and discussed later in this section.

Accreditation for engineering programmes worldwide is largely influenced by ABET’s procedure and guidelines (Patil & Codner, 2007). The ABET is also the consultant for the Washington Accord which is an international agreement among participating accreditation bodies responsible for accrediting engineering degree programmes (ABET, 2010a). Any engineering student who graduates from a degree programme which has been accredited by any of the signatory bodies of Washington Accord will be recognised by engineering bodies of other countries as having met the requirements for entry to the engineering profession (International Engineering Alliance, no date). The Washington Accord was founded in 1989 with signatory bodies from 6 countries, comprising the United States, Canada, the United Kingdom, Australia, New Zealand and Ireland. Today, Malaysia has earned its place as a signatory body of Washington Accord through its engineering body, the Board of Engineers Malaysia (BEM). With the adoption of EC2000, engineering programmes in many countries were restructured to comply with these criteria. As a member of the Washington Accord, the Board of Engineers Malaysia (BEM) reviewed its accreditation guidelines and criteria to align with the EC2000 (Aziz et al., 2006). As a result, 10
engineering graduate programme outcomes were developed (see Table 1-1). These outcomes became the basis for developing and designing engineering curriculum in Malaysia.

Table 1-1: *The Graduate Outcomes by ABET and BEM*

<table>
<thead>
<tr>
<th>Accreditation Board for Engineering and Technology (ABET), USA: Graduate Outcomes</th>
<th>Board of Engineers Malaysia (BEM): Programme Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Ability to apply knowledge of mathematics, science and engineering.</td>
<td>a) Ability to acquire and apply knowledge of science and engineering fundamentals.</td>
</tr>
<tr>
<td>b) Ability to design and conduct experiments, as well as to analyse and interpret data.</td>
<td>b) Acquired in-depth technical competence in a specific engineering discipline.</td>
</tr>
<tr>
<td>c) Ability to design a system, component, or process to meet desired needs.</td>
<td>c) Ability to undertake problem identification, formulation and solution.</td>
</tr>
<tr>
<td>d) An ability to function on multi-disciplinary teams.</td>
<td>d) Ability to utilise systems approach to design and evaluate operational performance.</td>
</tr>
<tr>
<td>e) Ability to identify, formulate and solve engineering problems.</td>
<td>e) Understanding of the principles of design for sustainable development.</td>
</tr>
<tr>
<td>f) Understanding of professional and ethical responsibility.</td>
<td>f) Understanding of professional and ethical responsibilities and commitment to them.</td>
</tr>
<tr>
<td>g) Ability to communicate effectively.</td>
<td>g) Ability to communicate effectively, not only with engineers but also with the community at large.</td>
</tr>
<tr>
<td>h) Broad education necessary to understand the impact of engineering solutions in a global and social context.</td>
<td>h) Ability to function effectively as an individual and in a group with the capacity to be a leader or manager.</td>
</tr>
<tr>
<td>i) Recognition of the need for, and ability to engage in life-long learning.</td>
<td>i) Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.</td>
</tr>
<tr>
<td>j) Knowledge of contemporary issues.</td>
<td>j) Recognising the need to undertake life-long learning, and possessing/acquiring the capacity to do so.</td>
</tr>
<tr>
<td>k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.</td>
<td></td>
</tr>
</tbody>
</table>

In Table 1-1, the column on the left shows the EC2000, the graduate outcomes of ABET. The first three outcomes are related to the acquisition and application of engineering knowledge while the remaining outcomes are related to the acquisition of soft skills such as problem solving skills, professional ethics, understanding of global and social issues, and life-long learning, as well as hard skills such as techniques, skills and engineering tools. The EC2000 requires a balance among knowledge acquisition, knowledge application, hard skills and soft skills, with the emphasis on soft skills. The right column shows the BEM programme outcomes. Outcomes *a* and *d* are related to acquisition and application of scientific knowledge and engineering fundamentals while outcome *b* is related to technical skills (hard skills). The remaining outcomes are related to soft skills. Similar to ABET graduate outcomes, the outcomes developed by BEM indicate a balance...
among knowledge acquisition, knowledge application, hard skills and soft skills with more emphasis on the soft skills.

Based on the descriptions on BEM outcomes above, the outcomes that are most relevant to English language teaching (ELT) are BEM c, g, h and j. Outcome c is related to problem solving skills, outcome g is related to communication skills within engineering fields, outcome h is about working effectively as an individual and as a team and outcome j is about a lifelong learning. These outcomes suggest that English language teaching needs to provide a language learning environment which develops team work abilities and the skills to communicate effectively among team members in engineering fields. Additionally, English language teaching also needs to consider developing problem solving skills among engineering students. These kinds of soft skills are not traditionally the focus of English language teaching in higher education. This highlights the new and challenging roles that English language teaching needs to play when equipping engineering students for the future workforce in engineering fields.

1.2.2 The impact on engineering education

The adoption of the EC2000 has prompted universities in the United States to restructure engineering education and reconstruct the engineering academic curriculum to support the achievement of graduate outcomes (McCowen & Knapper, 2002; Prados et al., 2005). While the focus on fundamentals of engineering has not decreased as a result of this process, the changes to the content courses provided opportunities for engineering students to learn the engineering fundamentals in context. In addition, the adoption of EC2000 led to an increase in focus on communication skills and problem solving skills in engineering education in higher education institutions.

Similarly in Malaysia, where the quality of engineers and engineering education is monitored by the Board of Engineers Malaysia (BEM), the change in job demands and the adoption of EC2000 in the United States triggered BEM to redevelop its requirements and criteria for accreditation. These requirements and criteria shifted an education system which focused largely on acquisition of engineering fundamentals, to an education system which balanced the acquisition of knowledge with the development of soft skills (Aziz, Noor, Ali, & Jaafar, 2006; Hashim & Din, 2009). As a result of this shift, teaching and learning in engineering education started to emphasise the development of soft skills including communication and problem solving skills (Hashim & Din, 2009). The revised accreditation criteria therefore not only affected engineering lecturers and their courses but also the EL educators who are required to teach these skills and the English language courses they developed.
1.2.3 The expectations of English language teaching in engineering disciplines

Responding to the demands of job markets in engineering industries and the revised requirements in engineering accreditation have raised challenges in developing English language courses for engineering programmes. English language teaching in this context needs to cater for the needs of engineering students who require a higher and more specific level of English language abilities than general effective communication skills. As such, English language teaching is not only required to focus on the enhancement of students’ mastery of the English language, but also to support the development of communication skills for the engineering discipline. This requires English language (EL) educators to have knowledge of engineering so that they can appropriately address students’ English language abilities and communication skills in an engineering context (Mackiewicz, 2004) which adds to the complexity of their roles.

Another challenge that arises is to determine the type of English language courses which can most effectively support the development of English language abilities and communication skills for engineering. The design of the English language courses should be domain-specific to motivate students to participate actively in the learning process, and to see the relevance of these courses in their engineering programmes (Baik & Greig, 2009; Kirkgöz, 2009). This requires EL educators to be familiar with engineering programmes.

Studies of English for Specific Purposes (ESP) have acknowledged the existing complexities in meeting the needs of students from various academic disciplines in English language teaching (see Bhatia, 2007; Medrea & Rus, 2012; Popescu, 2012). With the revised engineering accreditation criteria, the English language educators not only need to be familiar with communication in English, but also English for engineering contexts and the kinds of problems engineers have to solve.

1.3 Statement of the Problem

English language needs in engineering are reported to be different from other disciplines (Mackiewicz, 2004). In response to the revised engineering accreditation criteria, EL educators involved in teaching English to engineering students face complex challenges in teaching English language in ways that support the development of communication skills in English and in engineering. In this context, EL educators need knowledge about engineering to enable them to teach English and communication skills within an engineering context. Furthermore, EL educators also need to develop students’ problem solving skills, requiring them to have both the knowledge of English language discourses used in engineering and also conceptual understanding and knowledge
of teaching problem solving skills. However, there is limited research that has focused on how EL educators manage these challenges in the Malaysian context. Understanding the challenges EL educators face and how they manage them could shed light on English language teaching for a specific discipline, particularly in engineering fields in ways that may help EL educators to teach ESP.

1.4 Aims of the Study

The aim of this study was to investigate how EL educators managed the complexities in teaching English within a discipline-specific context, in this case engineering. The need to develop communication skills in English for engineering raises questions about the ways in which English language courses are positioned within an engineering-specific context and the implications of this positioning for the nature of the English language courses. Given that the needs of engineering students in learning English for Engineering differ from other disciplines, this study investigated how EL educators perceive, teach, reflect on and manage English language teaching in engineering. In order to unpack these complexities, this study addressed the following research questions:

1. How is English language teaching positioned in engineering education?
2. What are the complexities of English language teaching in engineering?
3. How do EL educators manage the complexities of English language teaching in engineering?

1.5 Significance of the Study

This study contributes to the field of English for specific purposes, particularly within Malaysian contexts where EL educators are generally trained as ESL educators to teach in schools. The findings of this study provide knowledge and understanding of the complexities of teaching English language for the engineering discipline in higher education. The study also contributes to research on English language teaching in Malaysia by highlighting the tensions, struggles and negotiations that EL educators faced to teach effectively within this context.

1.6 Structure of the Thesis

This chapter established the context of the study by exploring the nature of English language teaching in higher education, focusing on English for Specific Purposes (ESP) and English for Academic Purposes (EAP). The chapter also discussed the job market demands in engineering and the impact that engineering accreditation has had on engineering education and English language
teaching. In addition, the problem statement, the research questions and the significance of the study were also discussed.

Chapter 2 explores existing research in English language teaching in higher education, particularly in the context of English for Specific Purposes (ESP) and English for Academic Purposes (EAP) in various disciplines. This chapter also reviews engineering education, tracing the shift in focus from knowledge-based to outcome-based education. The final section in this chapter discusses the conceptual framework used to provide a lens to investigate the research questions.

Chapter 3 offers a rationale of the research design of this study. In particular, this chapter outlines the research design, method, data collection and data analysis procedures for this study.

Chapter 4 discusses the analysis of the documents related to the engineering accreditation requirements and procedures, the university objectives, the engineering programme descriptions, and the syllabus and course content of the English language courses. This chapter presents the findings on the positioning of the English language courses within the engineering academic curriculum and highlights the competing priorities among the stakeholders, namely, engineering authorities, the university, the engineering faculties, the students and the EL educators. This chapter also raises the issue of limited opportunities for the EL educators to respond to these requirements and to exercise agency within their institutional context.

Chapter 5 profiles the EL educators at the English Language Department at this university. The profiling provides a snapshot of how the EL educators conceptualise English language teaching within their institutional context and how they perceived the engineering accreditation requirements as well as their beliefs and practices in teaching English at this university.

Chapter 6 presents the findings on how the EL educators position English language teaching, and how they manage their beliefs and teaching and learning at this university which require them to exercise their agency.

Chapter 7 presents EL educators’ practices in teaching English for engineering. The chapter reports the complexities in managing English language teaching, involving teaching problem solving and communication skills in English.

Finally, Chapter 8 discusses the key findings that build knowledge and understanding of the complexities of teaching English within an engineering-based context and presents the implications for further research and for practice.
This chapter presented the background of the study, the statement of the problem, the aims of the study, the significance of the study and the thesis structure. The next chapter discusses and reviews the literature.
Chapter 2  Literature Review

Higher education institutions around the world play important roles in building human resources for the future workforce. Globalisation, however, makes it challenging for these higher education institutions to keep up with the changing professional demands of the workplace. In order to keep up with these changing demands, institutional goals will need to be constantly updated, and the curriculum, programme and courses will experience continuous changes. In Malaysia, for example, globalisation has changed the pattern of its economic trends, requiring expansion of industrial activities to international regions (Rostam, Jali, & Toriman, 2010). Therefore, it is crucial for higher education institutions in Malaysia to ensure that the future workforce is equipped with knowledge and skills that meet the demands of globalisation. This includes ensuring that graduates are able to demonstrate exceptional English language abilities. This creates challenges in English language teaching in higher education.

The first part of this chapter reviews research on the complexities of English language teaching in higher education. This contextualises the shift in English language teaching in higher education towards teaching English for Specific Purposes (ESP) which underpins this study. Literature on international research trends in ESP is also reviewed to highlight the need to teach English relevant to a specific discipline, specifically for engineering. It is argued that there is a need for research in the field of ESP from the perspective of English language teaching, focusing on the challenges for EL educators in teaching ESP courses, and in positioning themselves within a discipline specific context, such as in engineering.

The second part of this chapter reviews the literature on engineering education, particularly in Malaysia, raising issues within engineering education and the challenges in developing English language skills in Malaysian undergraduates. An initial section on the evolution of engineering as a field is included to contextualise the study and to provide a clearer picture of why these changes were required, and how these changes affect engineering education. Understanding this highlights the significance of the role of ESP programmes in engineering contexts. Next, the need for engineering education programmes to address the demands of engineering accreditation is discussed in terms of the impact of these processes in engineering programmes specifically in relation to how the engineering accreditation requirements frame the academic curriculum, and have transformed the nature of engineering education. The discussion identifies how the shift in focus in engineering education impacted teaching and learning in engineering classrooms, particularly on teaching problem solving and communication skills, and the use of English as the medium of instruction.
Through this structure, the review establishes the complex nature of engineering education in Malaysia, and an understanding of the challenges of English language teaching in higher education, particularly in implementing English for Specific Purposes programmes in this discipline.

The next section reviews research on English language teaching in higher education, focusing on English for Specific Purposes (ESP) in higher education at the international level.

### 2.1 English for Specific Purposes in Higher Education

English language teaching in higher education in countries such as Malaysia, where English is not the native language, was initially aimed to help students participate in class discussions and perform oral presentations in English. Thus, English language programmes were designed to develop and enhance second (L2) and foreign language (FL) speakers’ proficiency (Cruickshank, Newell, & Cole, 2003; Ransom, Larcombe, & Baik, 2005). However, research on English language teaching has reported that teaching general English which emphasises teaching grammar, syntax and phonetics is insufficient and less meaningful in higher education (Kitkauskienė, 2006; Ypsilandis & Kantaridou, 2007). In addition, globalisation requires graduates, not only to have exceptional levels of proficiency in English, but also to be able to put this English language proficiency into practice within their discipline and workplace contexts (Kitkauskienė, 2006). This led to the growth of ESP teaching in the 1980’s where English language teaching began to focus on teaching English for communicative competence (Bhatia, 2007; Cheng, 2007; Hayati, 2008; Hyland, 2003, 2007). Within the same time, ESP further evolved and English for Academic Purposes (EAP), which focused on teaching English in an academic context, emerged (Dudley-Evans & St John, 1998; Hyland & Hamp-Lyons, 2002; Jordan, 2002). In this study the term ESP is used as this term is more relevant for this study. In Malaysia, the trend for teaching English for Specific Purposes, or ESP, grew in the 1990s (Abdullah, 2001).

In addressing the growing demand for ESP in higher education, EL educators need to move from teaching general English to English specific to professional or discipline contexts (Basturkmen, 2010), a move that can be particularly seen in higher education institutions in Malaysia (Mustapha & Yahya, 2013). The challenges in this transition here, and in other countries, lie in EL educators developing clear understandings of ESP knowledge of academic or workplace discourses, and the skills to translate this knowledge into instructional practices (Grosse & Vought, 2012).
The challenges in conceptualising ESP and translating knowledge and skills into practice may cause conflicts or tensions in EL educators’ pedagogy in English language teaching. Evans and Green (2007), for example, investigated the implementation of EAP courses at an English-medium university in Hong Kong. They reported that these EAP courses paid limited attention to grammatical aspects. In Malaysia, Muhammad et al. (2013) reported similar findings about lack of attention to addressing grammatical aspects in EAP courses. The findings in both studies highlighted that the need to teach the content of the course may overtake the linguistics or grammatical aspect of the language. This raises questions about how ESP courses are conceptualised and if a balance between the elements of ESP that require teaching communication skills and grammatical aspects can be achieved.

The increasing need for English for Specific Purposes programmes in various countries has encouraged considerable research in the field of ESP. Recent trends in ESP research largely focus on needs analysis (Lockwood, 2012; Peters & Fernández, 2013; Spence & Liu, 2013; Tsou & Chen, 2014), implementation (James, 2010; Shi, 2013;) and evaluation (Knoch, 2014; Lam, Cheng, & Kong, 2014; Pryor & Woodward-Kron, 2014;) of ESP programmes in countries such as the USA, Australia, Hong Kong, France, China, Iran and Taiwan. This research is discussed further in the three sections that follow.

2.1.1 Needs analysis for programme design

When designing English language courses for a particular field, the appropriateness of content to students’ disciplinary background is a vital consideration. Thus, needs analysis should be conducted to inform the design and the content of effective ESP courses. Evans (2013), for example, raised the need to develop materials based on actual communicative activities and English language discourse in the workplace environment in Hong Kong. He collected questionnaire data from 1478 business professionals and semi-structured interview data from 31 professionals in Hong Kong to inform the development of a Business English course which provided an authentic workplace environment. The study identified the commonly used language discourses and communicative events in business. The language discourse used in the workplace was precise, concise and brief while the communicative events included both written and spoken elements.

While Evans (2013) conducted needs analysis from the perspective of business professionals, Bosher and Stocker (2015) examined language needs from the perspective of graduate nursing students. In their study, the researchers examined the use of English for nursing in Taiwan where English is learned as a foreign language. The researchers employed a narrative approach where 19 graduate nursing students enrolled in a master’s degree programme wrote essays
about the use of English and reasons for using English. The study reported the reasons for using English and the time when English is used in nursing.

Both of the studies above (Evans, 2013; Bosher & Stocker, 2015) reported communicative events and language use in the workplace from the perspectives of business professionals using self-reports gathered in questionnaires and interviews, and with graduate students through a narrative approach. Yu (2010) argued that self-reporting data may be biased or inaccurate and while it is suitable to obtain participants’ perceptions and beliefs on a particular issue, the information provided may also be partial. Thus, other methods of data collection need to be employed and data need to be obtained from EL educators as well to provide a broader understanding about the workplace environment from teaching and learning perspectives.

While the findings of both studies above provided understanding of English language use in the workplace, other studies that also collected data from multiple sources reported a mismatch in perceptions of language use in the workplace between students and professionals. Serafini, Lake and Long (2015), for example, conducted needs analysis in nursing with student trainees and domain experts (supervising principal investigators) through online questionnaires and semi-structured face-to-face interviews. Their analysis revealed a mismatch between what the trainees perceived they needed in their profession (language to perform tasks), and what experts perceived the trainees needed (language to overcome communication challenges). The findings informed course designers about how to bridge the gap between students’ language needs and language requirements by the experts.

When taken together, the results of these studies where data were collected from both trainees and experts reveal that the involvement of both sets of stakeholders is crucial in designing and developing ESP courses. However, these studies had limitations as they did not include the perspectives of EL educators who are involved in delivering these courses and who manage the teaching and learning process.

In another study, Bacha and Bahous (2008) conducted needs analysis using a questionnaire with 325 undergraduate business students and 37 EL educators who taught business English in Lebanon. The analysis of the responses showed differences between the students’ perceptions and the EL educators’ perceptions in terms of the existing content for the business English course and students’ English language abilities. Although the input obtained from EL educators could help to better improve ESP course design and content, results generated only from questionnaire data are insufficient in developing our understanding of the factors that might enhance or hinder course
implementation. A broader range of methods needs to be used to unpack the decisions and factors impacting on EL educators’ decisions related to both course design and implementation.

Common practice in the process of designing EL courses is that curriculum and materials are designed and developed by those involved in teaching the courses (Basturkmen, 2012). While the findings in the studies above (Bacha & Bahous, 2008; Evans, 2013; Serafini et al., 2015) are beneficial for enhancing the design and development of authentic and effective ESP courses, questions arise around issues of translating this information into the development and design of ESP courses and materials by EL educators in Malaysia who generally have ESL backgrounds. There needs to be further investigation on the process of developing ESP courses in Malaysia to better understand the challenges faced by EL educators and to further assist in designing, developing and delivering effective ESP courses.

Using different methods to identify language needs, Flowerdew and Wan (2010) investigated the language used by a group of four auditors in producing audit reports in Hong Kong. Through ethnographic approaches involving observation, interviews and textual analysis, the authors reported that professional auditors went through intense collaborative work and problem solving to produce an audit report in English. The study also found that knowledge about the principles of accounting and auditing, management skills in the workplace and knowledge about social situations which determine appropriate writing were required to address English language needs in auditing and accounting. The ethnographic approach used by these authors, who adopted methods that captured a range of perspectives about workplace language use, generated rich data about language use in context that extended our understanding of workplace needs beyond that provided by self-report data. In the context of this study, similar methods may provide rich insights into a context where EL educators are required to teach English when they may not have knowledge and experience of the workplace and social situations of a particular discipline.

Another needs analysis study to identify the linguistic needs of French mountain guides was carried out by Wozniak (2010). Professionals in this field were the key data source to identify linguistic needs in mountain guides. Three participants were interviewed and 53 participants completed a questionnaire. The researcher found that this profession was highly dependent on English as the language of communication and that specialised terminologies were required. In addition, the researcher reported that mountain guides needed knowledge about cultural differences in relation to clients’ communication expectations. While this is a significant contribution to teaching ESP, questions arise about how EL educators perceive and address linguistic needs for a specific discipline. An investigation that collects data from EL educators could provide
understandings about potential challenges that EL educators may encounter when interpreting linguistic needs of a particular discipline, translate them to the syllabus, and subsequently into teaching and learning experiences.

The methods and findings of the studies reviewed in this section have raised both research and methodological issues. The findings raised questions about whether EL educators have the specialised knowledge and skills to teach ESP in discipline contexts, or if this role extends them beyond their expertise in English language teaching. In this respect, studies on needs analysis have mainly focused on students’ language needs, whereas studies that address issues of EL educators’ needs to prepare them for ESP teaching have been limited (Basturkmen, 2012). Within the context of teaching English for a specific discipline, knowledge about a particular discipline, specialised language discourse and the culture that comes with the profession of a particular discipline are required. The interaction of these requirements creates complexities both in language events and challenges in curriculum design. These complexities require further investigation to understand how EL educators manage English language teaching within a discipline-specific context. In the next section, research on the implementation of ESP courses or programmes is reviewed to explore the challenges in implementing these courses or programmes.

2.1.2 Implementing ESP programmes

Previous research on implementing ESP programmes has commonly focused on piloting modules or practices that could be employed to teach ESP (Camiciottoli, 2010; Flowerdew, 2010; Mežek, Pecorari, Shaw, & Irvine, 2015). Flowerdew (2010), for example, piloted a business proposal module with final year undergraduate science students in Hong Kong. The module used a case-based approach, requiring students to evaluate and then to produce a business proposal. The researcher video-recorded students’ discussion of the task and analysed the proposal that they produced. The findings revealed positive outcomes, in terms of engaging students in their learning, and the relevance of the content to the students’ field of study as well as to their future workplace. In obtaining the data for her research, the researcher employed participant observation where she conducted the teaching of the business proposal module she designed herself. By being involved in the teaching and learning process, there is a potential lack of objectivity and the degree of emotional detachment in relation to the research is questionable (Iacono, Brown, & Holtham, 2009). In this case, the researcher is involved in the design and the teaching of the proposed module and is well aware of the goal of her research, and therefore may have influenced the outcomes of the teaching and learning process. The delivery process conducted by other EL educators in different settings may not produce similar outcomes. EL educators’ perceptions of a module or a course, as well as
their conceptualisation of a teaching approach, may differ from that of a researcher or even from each other. This raises the need to examine the lived experience of EL educators, particularly about how they perceive and conceptualise their work, and their approaches and practices in teaching within a specific context, where the researcher is a non-participant observer.

The language discourse or the type of language used in one discipline may vary from another. When examining 40 notes published in 1993 in three different law reviews, Feak, Reinhart and Sinsheimer (2000) found that there were significant differences between the English language used in professional and academic contexts. While the English language used in professional contexts was packed with problem-solution texts, it lacked rhetorical and linguistics conventions, unlike the English used in an academic legal context. Knowing and understanding these differences could provide an authentic English language learning environment in an ESP course. This raises questions about the extent of EL educators’ knowledge and understanding about the rhetorical and linguistics conventions involved in engineering industries when teaching an ESP course for engineering which can only be ascertained by collecting rich data directly from these educators in context.

Several studies on teaching and learning processes in ESP have been conducted in naturalistic settings. One such study was conducted by Wu and Badger (2009) in China. These researchers examined how three non-native EL educators, majoring in English literature or general English teaching with no formal training in maritime English, managed their teaching. Data were collected through unstructured interviews, classroom observations, stimulated recalls and semi-structured post-observation interviews. The study identified the strategies that these EL educators employed in their teaching when dealing with questions on the content, particularly the terminology and content-related vocabulary. These strategies included avoiding the questions and redirecting the students’ attention to the language aspects, providing literal translation, or opening the questions to other students to provide an explanation. Based on the findings, it could be concluded that content knowledge, which was problematic for these EL educators, may be a key element that contributes to the strategies used in teaching ESP. Further research needs to be undertaken in different disciplines to build our understanding about whether EL educators in different contexts similarly avoid addressing discipline-specific knowledge. Such information may assist in the development of strategies to build the capacity of discipline knowledge for EL educators to support their teaching so that deeper language learning can take place.

Effective delivery of ESP content is crucial to promote students’ learning and to develop the required knowledge and skills. The importance of delivery was reported in a study that examined
the writing of 40 first year students in the UK to determine how they responded to a data description task in statistics (Wharton, 2012). The researcher reported that students’ interpretation of the task influenced the mathematical formula that they chose, which finally impacted on the phrases and the sentences that they used to express their evaluative stance. In the context of ESP, students need to understand the instructions given in order to understand the content, highlighting the importance of the delivery process by EL educators. This raises questions about how ESP courses are interpreted by EL educators and the factors that impact on the kinds of pedagogies they implement to ensure students’ learning experiences align with the intended content and the language to be learnt.

The study by Wu and Badger (2009) raised concerns about the extent to which EL educators could deliver ESP course content if they have limited discipline-specific knowledge, while the study by Wharton (2012) questions the extent to which EL educators understand the kinds of discipline-rich content that needs to be delivered to develop students’ knowledge and understanding. While it could be concluded that having discipline-specific knowledge and understanding contributes to effective ESP teaching, there could be other potential factors that contribute to the complexity of teaching ESP that could impact on EL educators’ teaching practices. Further investigation is required to unpack this complexity to better understand positive factors and any potential hesitation, resistance or challenges to incorporating discipline-specific content into ESP teaching.

Evaluation of courses or programmes is a significant process to determine their effectiveness and is commonly conducted on content, design and teaching pedagogies. The next section elaborates these areas further.

2.1.3 Evaluating ESP programmes

Research trends in evaluating ESP programmes have focused on assessing the effectiveness of the programme, the appropriateness and availability of teaching resources and developing assessment criteria. Song (2006), for example, investigated the effectiveness of content-based ESL instruction on students’ English language performance. A total of 770 participants were recruited and were divided into two groups, a content-linked and a non-content-linked group. The researcher performed statistical analysis comparing the grades that students obtained for their English courses in the previous semester and the grades they obtained after the study. The results revealed that the students from the content-linked ESL course consistently performed better than those who were from the non-content-linked ESL group. Although the study showed positive results in improving and enhancing students’ English language performance, reports on the processes of teaching
content-linked EL courses were not available. The research needs to be extended to investigating the process of teaching that links language to content, or to a particular discipline to further establish how English language courses might be integrated more effectively in engineering.

Gorsuch (2006) investigated a pilot teaching practicum model whereby international teaching assistants who were non-native English speakers were required to teach English within a specific discipline. The study involved 15 pre-service international teaching assistants in the USA and data were collected through two sets of questionnaires. The findings indicated that the participants perceived learning to teach English within a specific discipline was more motivating and purposeful. In this study, all of the participants reported that they taught according to their disciplinary background. However, the use of self-reports through questionnaires provided limited information about how the content was delivered and whether the teaching assistants were both confident and knowledgeable in the disciplines they were teaching. There needs to be further research using more naturalistic methods in context to investigate the confidence and motivation of EL educators teaching English outside of their own discipline in order to unpack the complexity of teaching English for a specific discipline.

When investigating the extent to which professional genres taught at the university are parallel with the professional discourses in real workplaces in Hong Kong, Lam, Cheng and Kong (2014) reported that there was a disconnection between the genres taught and the genres in the workplace. This disconnection may lead to the development of knowledge and skills which do not meet workplace expectations. Establishing a connection between what is taught at universities and what is expected in the workplace is only one part of the complexity of English language teaching for a specific discipline. Another area of complexity is the teaching and learning process of teaching English for a specific discipline. Examining how course content is being conceptualised and delivered in engineering could inform the enhancement of teaching and learning in this field.

This section reviewed the literature which focused on ESP programmes, raising issues in relation to teaching and learning which require further investigation. The next section explores ESP research which investigates the process of teaching and learning from the perspectives of students who are the receivers of these programmes, and EL educators who are the agents who implement these programmes.

2.1.4 EL educators’ and students’ identities in an ESP classroom

English language teaching and learning does not only involve identifying language needs, designing and implementing a programme and evaluating its effectiveness. While research on needs
analysis, implementation and evaluation in ESP are crucial, there is also a need to examine the process of delivering ESP programmes, particularly in the area of ESL educators’ and students’ identities in the classroom (Archer, 2008; Hyland, 2011; Zareva, 2013).

Hyland (2011), for example, investigated how academics constructed their identity in the context of the university as a workplace. By examining the texts written in English, visual design and hyperlinks of 100 homepages of academics from the field of philosophy and physics, the researcher found that academics encountered tensions and negotiations in constructing their online identity. This raises questions about how the process of constructing identities creates tensions, how these tensions are negotiated and what elements are being negotiated. These questions need to be investigated further, particularly in the context of English language teaching in a specific discipline.

The construction of learners’ identities within their learning environment “is not a matter of free choice from a wide range of freely available alternatives” (Zareva, 2013, p. 81). Rather, it is influenced by various factors including students’ background, beliefs and knowledge to interpret their learning (Archer, 2008). Thus, recognising learners’ identities within a learning environment is vital to assist educators in managing their teaching. In her study, Zareva (2013) examined students’ identity construction through their academic presentations. Twenty individual presentations were recorded from TESOL (Teaching English to Speakers of Other Language) graduate students. The students also completed a questionnaire which profiled their educational background and their beliefs about English language teaching. The findings showed that students constructed multiple identities in one lesson. This raises questions about how English language teaching is managed in order to address students with multiple identities, particularly when teaching English for a specific discipline.

Recently Taylor (2014) investigated the use of mother tongue in identity and participation in discussing engineering content among one ESP educator, nine engineers and one marketing executive in a 40-hour English language course at an engineering company in Thailand. The researcher employed three methods of data collection; field notes from communities of practice; interviews and a questionnaire to capture data related to various aspects of English language teaching and learning. The findings revealed that the participants preferred to discuss engineering issues in their first language, although they were experts in their field and their English proficiency level ranged from intermediate to upper-intermediate. The findings highlighted the preference in using first language when discussing engineering information in professional contexts in a setting where English is a foreign language. This may be the case among engineering students in an ESP context which may contribute to resistance and challenges among students to learn ESP, indicating
potential challenges for EL educators to address students’ language needs in engineering. This requires further investigation, particularly in an ESL setting.

Shifting identity as an EL educator towards becoming an ESP educator is a complex process. This complex process was investigated in a study conducted by Ghanbari and Rasekh (2012). These researchers examined the lived experience of two EL educators who had taught ESP for more than 25 years at a petroleum university in Iran where English was a foreign language. The objective of the ESP course at the university was to prepare future engineers to cope with the content knowledge involved in the petroleum industry and to function proficiently in everyday English. This course was designed in such a way that EL educators were required to have sufficient knowledge about petroleum. Drawing on semi-structured interviews and classroom observations, the study found that at the beginning of their career as ESP educators, the participants struggled in controlling teaching and learning although they were the language experts. As they gained more experience and knowledge in petroleum, they became confident and were able to take control of teaching and learning. There is a sense of shifting from an EL to ESP identity in different contexts and disciplines such as engineering which requires further investigation to better understand the complex process of becoming an ESP educator.

Although there has been increasing interest in issues of identity in teaching and learning, research on these issues in the field of ESP is limited (Hyland, 2011). Many of the studies of identity found in the literature were commonly from an English language learning point of view, while research from English language teaching perspectives was limited. Several studies have shown that academics’ professional identities have an impact on the pedagogies that they employ in their teaching (Boyd & Harris, 2010; Kreber, 2010; Lee & Yin, 2011). This calls for an investigation of EL educators’ professional identities in an ESP context as they are the actors who implement an ESP programme. The next section reviews research on teaching English for a specific discipline in engineering, particularly in Malaysia, in order to explore English language teaching for a specific discipline.

### 2.1.5 Discipline-specific English language teaching

ESP courses are generally developed based on common communicative events that occur in various professional arenas (North, 2005). Since such courses are not designed for a specific discipline, they may be insufficient to cater for students’ language needs as these needs vary across disciplines (Kuteeva & Airey, 2013; Hyland, 2002).
Storey (2013), for example, examined the sufficiency and relevance of the content of EAP courses for reading and writing at a Malaysian university. The study found that the content involved introducing students to eight genres in writing. Of the eight genres, the participants only used one which was relevant to their discipline. This finding implied that genres commonly encountered by students studying in a number of disciplines may not be encountered by students in other disciplines. In addition, the genre mostly required by a particular group was not included in the course, and the content was not specific for any particular discipline. In this instance, these courses had been designed and developed by EL educators who had limited experience of industrial discourses and who were thus not equipped to integrate discipline-specific content. In exploring the implications of this limited experience for teaching ESP, Burns and Moore (2008) found that many EL educators were disconnected from the professional discipline workplace as their experience about workplace and knowledge about language discourse of a particular profession were limited. As a result, these English language educators could not cater for a specific discipline. Storey (2013) and Burns and Moore (2008) suggest that specific language needs or discourses for students of a particular discipline may not be addressed in ESP programmes and courses because EL educators may be teaching outside of their discipline. This adds to the challenges that these educators face in designing and teaching discipline-specific courses.

Another study found that the language learning environment for students of one discipline varied from another, depending on their language needs in a particular discipline, reflected in the goals of the ESP courses (Shah et al., 2013). Shah et al. investigated the learning strategies used in learning English for Specific Purposes for economic and engineering students at one public English-medium university in Malaysia. The questionnaire data were collected from 139 economics students and 51 engineering students using the SILL (Strategy Inventory for Language Learning) (Oxford, 1990). The study found that the language needs and expectations in economics differed from engineering. This suggests that EL educators need to have clear understandings of the demands of an ESP course, the language needs of a particular discipline and the knowledge of language discourses of students’ respective disciplines to facilitate their language learning. A question arises as to whether this is the case for EL educators teaching at a technical university, particularly within engineering contexts.

Teaching the specialised language discourse for a specific context or discipline is vital to ensure that accurate information is conveyed. In medicine, for example, Popa (2013) argues that the medical field has its own set of language discourses which need to be communicated accurately to save lives. In engineering, there are technical words and terminologies which are specialised for engineering that engineering students need to learn to help them read and understand engineering
materials, and convey engineering information effectively (Mudraya, 2006). There is some limited research indicating that this is problematic. For example, Gabrielli et al. (2012) conducted an investigation on contextualised English language teaching and learning into maritime engineering at a university in Sweden. Two English for Maritime Engineering courses were developed. The first course concerned basic English language skills which included vocabulary and grammar, as well as oral and written skills for various technical contexts. This course was taught in second year. The second course was taught in year three and focused on technical language. Elements of the language and communication skills of these two courses were incorporated into two maritime engineering courses in year two and another two maritime engineering courses in year three. Students were expected to apply the language and communication skills they acquired from English language courses to the maritime engineering courses. The researchers reported that there was a disconnection between the language discourse learnt in classrooms and the language discourse in the workplace. They argued that the ESP courses needed to be contextualised through integrating language and maritime engineering content. The need for contextualised English language courses requires ESL educators to have some knowledge of or resources related to an engineering discipline, and of the language discourse of that particular discipline in real life contexts. While Gabrielli et al. (2012) suggested an appropriate course design and teaching strategies to integrate language and content in maritime engineering, studies on how EL educators perceive and manage teaching ESP in other engineering disciplines are needed to provide insights into the complex nature of English language teaching for engineering.

In addition to knowledge and understandings of teaching ESP, the availability of resources is crucial for ESL educators, particularly when their knowledge about a particular discipline is limited (Medrea & Rus, 2012). The lack of knowledge, understandings and resources suggest potential challenges and constraints for EL educators in teaching ESP in higher education institutions. Examining EL educators’ teaching practices in a specific discipline such as engineering is significant in the field of English language teaching as it builds greater knowledge about the complexities of teaching and learning in such a context.

In reviewing the research on teaching ESP, Shamsudin et al. (2013) found that engineering students in Malaysian higher institutions were required to read textbooks and resources which contained large amounts of specific technical vocabulary and fundamental engineering terminologies. Thus, they argued that an engineering English vocabulary list was needed to help engineering students navigate through their study. Hsu (2014), in her study which examined the engineering English vocabulary in engineering textbooks, found that each engineering discipline required different sets of words. Marine and biochemical engineering, for example, involved 8500
specialist words while civil and mechanical engineering involved 3500 words. Both studies highlight the need for EL educators to acquire a wide range of engineering vocabulary in English to enable them to teach English for engineering. Further investigation is required to identify EL educators’ knowledge and understanding of specialised language discourses for engineering and the complexity of integrating such discourses, and to examine the extent to which specialised language discourses are integrated in ESP courses in engineering.

Studies reviewed in this section have raised questions about whether EL educators have the knowledge, understanding and pedagogical skills to enable them to teach ESP effectively in the context of engineering higher institutions, and the kinds of factors that influence their transition from being EL educators to ESP educators in this context. Khamis, Hussin and Nor (2014) have proposed a conceptual framework which could equip EL educators to become ESP educators. This conceptual framework proposes that EL educators should develop professional values in English language teaching, knowledge of content, in this case engineering, skills of teaching and learning in ESP and knowledge about engineering education requirements, such as Engineering Accreditation Manual (EAM). This conceptual framework suggests that there may be a range of interactions between English language educators’ conceptualisations of English language teaching (knowledge, beliefs and pedagogy about English language teaching) and engineering education (engineering accreditation requirements and expectations). However, further investigation is required to better understand the impact of these interactions on EL educators’ conceptualisations of English language teaching and their teaching practices within engineering contexts.

This section has highlighted the need to integrate specialised language discourses for engineering in ESP courses, raising questions about EL educators’ knowledge and understanding about these specialised language discourses for engineering. In addition, challenges arise in managing students of limited proficiency in learning English for engineering. The next three sections further elaborate the challenges in teaching English for a specific discipline.

2.1.5.1 Balancing content, soft skills and English language teaching

EL educators in higher education in Malaysia face continuous challenges in developing the English language abilities of their students to meet job market demands of the engineering industry. Apart from ensuring students’ mastery of English language, EL educators also need to address students’ communicative abilities (see Danilova & Pudlowski, 2007; Ngah, Radzuan, Fauzi, & Abidin, 2011; Riemer, 2007; Spence & Liu, 2013). In investigating engineering students’ perceptions of communication in engineering, Eriksson and Carlsson (2013) surveyed 171 engineering students in Sweden where Swedish was the medium of instruction in engineering
courses. Of this number, a small sample of 30 was interviewed. The findings showed that students highlighted the significance of communication in the engineering profession and conceptualised communication in engineering as writing reports and oral presentations. In another study in the USA, Dannels et al. (2003) reported that undergraduate engineering students viewed report writing and preparing for presentations as distracting them from focusing on the production of their engineering tasks. These 37 students enrolled in a course which required them to work on a project and produce and present a final report. The study found that these engineering students struggled to balance content and communication tasks.

Both Eriksson and Carlsson (2013) and Dannels et al.’s (2003) studies identified report writing and oral presentations as common communicative activities that engineering students need to perform academically and professionally. Although developing writing and presentation skills to perform engineering tasks are crucial in engineering, there is some evidence that preparing reports and presentations in English affects students’ performance in completing their engineering tasks. In the first study, English was not highlighted as the language used for communication in engineering while in the second study, students struggled in performing communicative tasks in English. In the case of EL educators teaching second language learners in second language settings, the challenge would be to balance content, communication activities and English language teaching. However, there is limited information about how EL educators do this.

The transformation of engineering education into outcomes-based education has also emphasised developing problem solving skills (see Aziz et al., 2006; Hashim & Din, 2009; Tang et al., 2012). The need to teach problem solving skills is not only limited to engineering courses but is also relevant in English language courses. In addressing the need to teach problem solving skills, educators’ different understandings of problem solving skills could cause a misalignment between soft skills required by engineering and soft skills usually developed in language classrooms. This misalignment was discussed in a study by Affandi et al. (2012) which examined teaching soft skills in an engineering course. A questionnaire was distributed to three public universities in Malaysia and responses were received from 44 engineering lecturers. The researchers found that participants reported varied understandings of soft skills and that these understandings were different from the expectations of engineering industries. This study highlighted the ambiguity in educators’ understandings of these soft skills that influenced their instructional practices and assessment. In the context of teaching problem solving skills, EL educators may understand problem solving skills for generic contexts but these may be insufficient to teach problem solving skills to engineering students. Since there is limited information about whether this is the case, an investigation is needed to examine EL educators’ understanding of problem solving skills. In addition to questionnaire and
interview data, there is a need to conduct classroom observation on EL educators’ teaching and learning process to examine the degree of impact of their understanding on their teaching practices, particularly in terms of teaching problem solving skills.

This section has raised questions about the emphasis of English language teaching when the content of a particular discipline such as engineering is integrated into English language teaching. The way EL educators manage their teaching in this context may be linked to the way they conceptualise English language teaching, specifically ESP. The next section reviews research on how ESP has been conceptualised.

2.1.5.2 Addressing language learning issues

Students’ language learning characteristics and English language performance influence the ways in which EL educators frame their teaching in their classroom. Understanding students’ language learning strategies assists EL educators to customise their teaching approaches and strategies to address their students’ language learning needs. Shah et al. (2013) investigated the learning strategies of ESL learners at a higher education institution where 312 students from an English-medium public university completed a questionnaire on language learning. These students, who had high English language proficiency levels, were from three faculties: Economics and Management, Human Sciences and Engineering. This study reported that the majority of the students preferred to learn in groups. However, while learning in groups was beneficial in developing students’ communication skills and team work, the use of English language as the medium of interaction among group members could not be ensured. In addition, there could also be students who prefer to listen to lectures and perform tasks individually (see Amir & Jelas, 2010). This raises an issue about how EL educators manage teaching and learning to cater for students with a wide range of proficiency levels and learning styles, and simultaneously provide a space for English language and communication skills development.

In teaching ESP, challenges around addressing students’ limited proficiency in English and motivation are inevitable (Gupta, 2013). Several studies have reported issues associated with Malaysian undergraduates’ limited English language proficiency and motivations towards learning the language (Ahmad & Jusoff, 2009; Che Musa, Lie, & Azman, 2012a, 2012b; Gill & Williams, 2013; Shah et al., 2013; Radzuan & Kaur, 2011). With limited proficiency in understanding and using English, as well as in motivation, students struggle in learning English specialised for a specific field. Evans and Morrison (2011), for example, investigated the experiences of 28 first year students of business, applied sciences, textile and health and social sciences in overcoming language-related challenges in Hong Kong. The authors reported that students had difficulties in
understanding discipline-specific technical terms during lectures and the extent to which these difficulties were resolved depended on the students’ education background and their existing language abilities. This indicates that when students have limited proficiency in English, using materials which are discipline-specific, for example materials from an engineering discipline, could distort the learning process and learning outcomes may not be achieved. This raises tensions, for example, about how EL educators determine their instructional levels to cater for diversity, and how to balance the need to develop general English (language structure and grammar) with discipline specific skills (specialised English specific for a particular field, for example, engineering). Understanding these tensions can provide deeper insights into the complexities of teaching English for a specific discipline. In addition, it is crucial for EL educators to obtain knowledge of a specific discipline such as engineering in order to guide students’ learning and address their language needs within the context of the discipline. Further investigation is required to provide knowledge and understanding about how EL educators manage these tensions in their teaching.

Managing ESL learners who lack motivation due to their limited proficiency in English is challenging. For example, Hiew (2012) examined students’ perceptions of English language teaching and learning in higher education via Facebook. Forty-six students from a private college and a public university in various programmes wrote responses based on three questions about English language teaching and learning. Their proficiency levels ranged from low to fairly high. The participants were also required to respond using correct English and to avoid using abbreviations. The findings showed that the majority of Malaysian students hesitated to speak English either in or outside an English language classroom. One of the factors contributing to this hesitation was self-consciousness about accuracy in language production. The study reported that these Malaysian undergraduates perceived making grammatical mistakes as embarrassing because it revealed their lack of proficiency in the language. In addition, Malaysian students in higher education institutions are generally passive English language learners (see Gupta, 2013; Kuteeva & Airey, 2013). Thus, self-consciousness and passive learning approaches of ESL learners may limit interactions among students and between teacher and students which can interfere with the development of communicative competence. Further investigation through classroom observation is required to obtain broader understanding of how this impacts on EL educators’ practices in teaching specialised English as well as teaching communication and problem solving skills.

Various approaches and strategies have been identified and employed to create a language learning environment that encourages language development and active learning. For example, Chan and Zahar (2012) examined the use of a questioning strategy in language teaching to gain students’ attention, stimulate involvement, and promote critical thinking. Twenty language
educators in Malaysia completed a questionnaire related to the kinds of questions that they asked during teaching and learning. The findings showed that these educators experienced difficulties in obtaining students’ responses when employing questioning effectively due to students’ limited language proficiency, vocabulary, self-confidence and motivation. These findings are consistent with those of Hiew’s (2012) study and raise the issue of students’ limited proficiency in English and self-confidence which could limit language production. The questionnaire data provided information about educators’ reported challenges in dealing with students’ limited proficiency, vocabulary, self-confidence and motivation. Data obtained from classroom observations can provide broader understanding about potential challenges that EL educators may face when teaching ESP in this context.

The issues highlighted in Hiew’s (2012) and Chan and Zahar’s (2012) studies, which are about limited proficiency in English, self-consciousness and passive learning, creates challenges for EL educators to manage English language teaching for engineering which addresses teaching problem solving and communication skills. This raises a question about the extent to which English language learning can take place in a setting where students may also be unsure about technical English language related to engineering.

Constructing teaching in ways that address students’ self-confidence and language learning anxiety is crucial in order to help language learners improve their proficiency in English. Common strategies used in English language teaching are elicitation, drilling, traditional lecture, group discussion, guided discovery and mind mapping strategies (Ng & Ng, 2012; 2013). Studies have shown that recent approaches used to address students’ language learning issues in English language teaching are problem solving and problem-based learning (Hussein, Roslan, Noordin, & Abdullah, 2012; Othman & Shah, 2013).

Hussein et al. (2012), for example, conducted a study to investigate the use of a problem solving approach (PSA) to teach writing to international students at one university in Malaysia. The participants were 24 students whose mother tongue was either Persian or Arabic. Their proficiency in English ranged from low to intermediate. Data were collected from one individual essay and two group work essays. Problem solving approach (PSA) was employed in the group essay task by presenting each group with a problem. When comparing the individual and group work essays, the study found that PSA helped in students generating good ideas, and improved students’ content and vocabulary. In addition, the use of PSA also helped lower students’ language learning anxiety as students learned the language from each other.
Research on the use of problem-based learning (PBL) approaches in English language classrooms in Malaysia has generated similar results. When investigating the use of PBL approach to teach writing, Othman and Shah (2013) reported that improvements in students’ writing could be observed. This study involved 128 third-year students from one public university in Malaysia. In comparing the pre- and post-writing tests, it was found that students improved in terms of presenting content and arguments in their writing. Results of a proficiency test showed that there was also a slight improvement in the students’ language accuracy. These studies (Hussein et al., 2012; Othman & Shah, 2013) showed that PSA and PBL had positive impacts on students’ writing in that there were improvements in presenting content and argument, and students’ language accuracy. In relation to the present study, the focus is on the integration of problem solving into English language teaching, rather than examining the effectiveness or the impacts of using these approaches. Given that the writing tasks in both studies were produced as a group, English may only be used at the production stage. This raises the need to further investigate the use of problem solving in English language teaching to provide insights about how and to what extent the integration of problem solving into English language teaching can improve language teaching and learning, particularly in relation to teaching ESP.

The literature discussed in this section raised several issues the EL educators considered in framing and managing their teaching. These issues included balancing students’ confidence and motivation in learning and using English, as well as students’ proficiency levels. EL educators need to understand their students’ learning strategies and language needs in order to identify appropriate teaching approaches and strategies that cater to students’ diverse language learning styles and language needs, with the added challenge of teaching within a specific discipline such as engineering. While there is a range of diverse strategies and approaches that are useful in that context, the ability to use them is dependent on EL educators’ understandings of these teaching strategies or approaches. A study which investigates approaches that EL educators utilise in relation to teaching English within an engineering context can provide a deeper understanding of how EL educators manage the challenges of meeting the diverse needs of students in this context. A further question remains about how EL educators manage students’ language learning issues when teaching English for a specific discipline, particularly in engineering. The ways that they address these issues and frame their teaching may be related to the ways they position themselves within such a context. This is discussed further in the next section.
2.1.5.3 Positioning EL educators in a discipline-specific context

The move towards teaching English for Specific Purposes (ESP) has required EL educators to develop knowledge and skills to meet the goals of ESP. In their teacher education, for example, EL educators are generally taught about the principles, theories and practices that prepare them to teach English for general purposes (see Bolitho, 2002; Evans & Esch, 2013; Ong et al., 2004; Tercanlioglu, 2004). When teaching ESP, EL educators need to transform their conceptualisation of communicative language teaching that focuses on teaching the language system for common functions to develop an understanding of language discourses which could be applied to a particular discipline (Alexander, 2012).

EL educators are commonly equipped with teaching pedagogies and knowledge about English language to teach in school contexts (Bolitho, 2002; Kabilan & Izzaham, 2008; Ong et al., 2004; Zeichner, 2005), and several studies have found that EL educators face challenges in transferring these pedagogies and teaching skills to university contexts (Cross, 2010; Deng, 2004; Viczeko & Wright, 2010). For example, Alexander (2012) investigated EL educators’ beliefs about teaching EAP. She reported that the two EL educators who taught EAP experienced conflicts between teaching language structure and grammar, and teaching functional language for academic contexts. The findings emphasised the importance of developing knowledge and understandings of teaching English for a particular context or discipline so that they could position themselves within their educational contexts and identify their roles.

In the case of moving from school to the adult learning contexts of a university, the transitions may interfere with EL educators’ professional identities and affect their teaching approaches (Viczeko & Wright, 2010). Kanno and Stuart (2011) investigated how novice EL teachers in the USA learned to teach. Their participants were two second year Master in TESOL students who had limited teaching experience. They found that their participants, who taught for the first time as teaching assistants, were uncertain about their roles in their new contexts. They were not able to position themselves as ESL educators and therefore were not able to take control of teaching and learning. This raised challenges for these teachers in framing their teaching when their professional identity was unclear. In addition, this study showed that EL educators still struggled with their professional identity even within the educational setting that they were trained to work in. This raises potential challenges for EL educators who move to teaching in higher education institutions which place different demands on their knowledge with expectations of higher levels of content knowledge and teaching skills suitable for adult learning environments. Thus, a study that examines EL educators’ beliefs and teaching is required to obtain insights into how they reposition
themselves in higher education institutional settings and how they construct their professional identities within such a setting.

The findings from Kanno and Stuart (2011) highlight the significant role that professional identity plays in teaching and learning. This raises questions about the nature of the professional identities of EL educators teaching within an engineering context, and whether these identities are transformed when there is a deeper understanding of this context. While Kanno and Stuart (2011) investigated EL educators who had limited teaching experience, Scotland (2014) investigated the professional identities of 10 experienced EL educators in Qatar. His participants came from various countries and had experience in teaching English in countries other than their own. The findings indicated that only three of the participants negotiated and transformed their professional identities while others maintained the professional identities that they first brought into their current workplace perceiving that they did not need to change. Scotland’s findings illustrated that the fluidity of professional identities is associated with perceived agency to negotiate or renegotiate such identities. In the formation and transformation of professional identities, professional agency plays a significant role (Hökkä, Eteläpelto, & Rasku-Puttonen, 2012). With this notion, investigations of professional agency can provide insights about the development of professional identities of EL educators and the ways they frame their teaching in engineering. However, there is limited information about the development of professional agency and how this impacts on English language teaching in this context. This calls for an investigation of professional identities among EL educators teaching in specific disciplinary contexts and, in the case of this study, in engineering.

The review of the literature in this section has highlighted the complexity of English language teaching in a discipline-specific context, involving three elements. These are, ESP courses (design, implementation and evaluation), the identities of EL educators who are repositioning themselves from a school to university disciplinary context and managing the students’ confidence, motivation and proficiency levels. The discussion of these three elements has reinforced the need for research investigating the experience of EL educators teaching English in higher education institutions for a particular discipline, in this case engineering. The next section discusses issues around engineering education in higher education and the interactions between engineering education and English language teaching to examine the complexity of English language teaching in this discipline.

2.2 The Evolution of Engineering Education

Globalisation and economic growth worldwide have caused rapid changes in technology and job demands in engineering industries. These changes have greatly impacted job requirements.
High academic achievement is no longer the single criterion for recruitment in engineering industries. Rather, demonstrating abilities to link knowledge to practice, work collaboratively and function effectively in various situations, and cope with technological advances are now in demand in engineering industries (Baillie, 2007; Jakobsen & Bucciarelli, 2007; Jonassen, Strobel, & Chew, 2006; Prados, Peterson, & Lattuca, 2005). These abilities also include problem solving and communication skills as engineers frequently face problem solving situations throughout their career and work with team members from multinational backgrounds (ABET, 2013; Engineering Accreditation Council, 2007; Mourtos, Okamoto, & Rhee, 2004a). This change has led to changes in accreditation requirements for engineering programmes in higher education institutions in Malaysia and subsequent initiatives to revise the traditional focus of engineering education (Basri, Che Man, Wan Badaruzzaman, & Nor, 2004; Patil & Codner, 2007).

Traditionally, engineering education curricula in higher education in many countries comprised basic sciences and engineering knowledge (Jakobsen & Bucciarelli, 2007). The main aim of these programmes was to produce future engineers with strong engineering fundamentals because engineering graduates with high academic achievement were sought after. However, research on engineering graduates’ employability found that such engineering graduates lacked abilities to function effectively in workplaces although they performed well academically (Azami, 2008; Cirin et al., 2006; Tong, 2003). It has been argued that this traditional curriculum restricted students’ development of their abilities to apply knowledge to practice, and to learn to collaborate in developing professional skills (Baillie, 2007; Christiansen & Rump, 2007; Jonassen et al., 2006; Kammesheidt, Idrus, Trockenbrodt, & Hahn-Schilling, 2007).

With overwhelming demands for engineers who are able to solve complex technical problems and work with people who have different perceptions, languages and cultures, engineering education has shifted from focusing on knowledge performance to emphasising processes of learning (Engineering Accreditation Council, 2007; Sheppard, Colby, Macatangay, & Sullivan, 2006; Trevelyan, 2010). This shift has led to a range of recommendations related to the design of the engineering education curriculum. Hamzah, Ismail and Isa (2012), for example, proposed a conceptual model for epistemology of knowledge in engineering that emphasises application of knowledge and integrates knowledge, skill and attitude. In another study, Gattie, Kellam, Schramski and Walther (2015) argued that traditional engineering education provided an “oversimplified worldview of problem solving” which could create contrast between what is learnt in an engineering programme and the real world and therefore proposed a theoretical basis of engineering education as a complex system (p. 527).
Deciding on a framework or a theory to employ in designing a curriculum is only one of the concerns that need to be considered. Another concern is how information about this framework or theory is understood by all stakeholders, particularly EL educators. This calls for an investigation into the extent to which all educators, particularly EL educators, understand the curriculum of engineering education.

Recent engineering programmes strive to balance the acquisition of engineering knowledge and development of soft skills (Chao & Kheng, 2006; Rover, 2008; Said et al., 2013). Among the soft skills that are highly regarded in job markets are English language abilities, communication and problem solving skills. In performing complex problem solving, engineers interact with a diverse workforce, requiring them to have high levels of critical and analytical thinking skills, communication and teamwork skills, and understanding of engineering practices (Felder, 2012). In addition, engineers’ knowledge is not only bound to their own engineering field but also includes others, ranging from mechanical, civil, electrical, to chemical and biochemical engineering (Ihsen & Buschmeyer, 2007). Thus, engineering education must prepare engineering students for this work environment and help these future engineers develop and implement new technologies (Sheppard, Macatangay, Colby, & Sullivans, 2009).

In many countries, the quality of engineering graduates produced by universities is monitored by engineering bodies; for example, ABET (Accreditation Board of Engineering and Technology) in the USA, ECUK (Engineering Council UK) in the UK, EA (Engineers Australia) in Australia and BEM (Board of Engineers) in Malaysia. Realising the need to ensure the quality of future engineers, engineering bodies in these countries, including Malaysia, reviewed their requirements and criteria for accreditation of engineering programmes, emphasising the achievement of graduate outcomes (Hassall, Joyce, Montaño, & Anes, 2008; Kavanagh & Drennan, 2008). In 2003, the revised manual for accrediting engineering programmes was developed by the engineering body, BEM, in Malaysia. This led to the transformation of engineering education from a traditional to an outcome-based education system.

In Malaysia, engineering programmes are structured and monitored by a statutory engineering body, The Board of Engineers Malaysia (BEM). The Board is a member of the Washington Accord which provides mutual recognition for graduates from engineering programmes accredited by its members. This means that through studying in programmes that have received accreditation from BEM, Malaysian engineering graduates are acknowledged worldwide and have opportunities to practice as professional engineers internationally. The requirements of accreditation, therefore, have a significant impact on what is taught in Malaysian universities. The
next section reviews research on engineering education in higher education to further explore how the requirements of engineering accreditation impacted engineering education in Malaysia.

2.2.1 Engineering education in Malaysia

In addressing professional and industrial demands, and technological advances, engineering education faces the challenge of developing programmes that support the acquisition of knowledge and the development of skills which enable engineering graduates to survive the changing demands of their profession. In Malaysia, higher education institutions offer a wide range of engineering programmes. These programmes include Automotive, Biosciences and Medical, Bioprocess, Civil, Chemical, Computer, Environmental, Electronics, Electrical, Mechanical, Manufacturing, Microelectronic, Mechatronic, Materials and Petroleum and Renewable Energy.

Malaysia is a participating member of the Washington Accord, an international engineering agreement that recognises engineering qualifications among participating countries (Aziz, Noor, Ali, & Jaafar, 2006). As such, engineering programmes in Malaysian higher education institutions must achieve the standard and quality agreed upon in the Washington Accord. The requirement to achieve this standard and quality resulted in two outcomes. These outcomes are, first, an engineering accreditation process is conducted to certify that engineering programmes have achieved the standard and quality, and second, engineering education focuses on achieving graduate outcomes (Engineering Accreditation Council, 2007; Soon & Quek, 2013).

The implementation of accreditation has enhanced engineering education in Malaysia in several ways. Said et al. (2013), for example, surveyed 32 engineering educators in Malaysian universities. They reported that accreditation improved the quality of engineering education in terms of the organisation of teaching and learning, a focus on student learning, and in achieving stronger learning outcomes. Their study also found that there were improvements in the quality of teaching as educators had better understandings of teaching methodologies. While the study found positive implications of accreditation for engineering education on teaching and learning, the results were generated mainly by self-reporting through responding to a questionnaire. In addition, data were not obtained from the perspective of EL educators to explore the extent to which they addressed the requirements of engineering accreditation. Further investigations employing other methods such as interviews and classroom observations are required to better understand ways in which teaching and learning is managed to meet the requirements and criteria for accreditation, particularly from the perspective of EL educators.
The shift from focusing on acquiring theoretical engineering knowledge to focusing on outcomes has placed more emphasis on the development of communication and problem solving skills (Chickerur & Kumar, 2012; Soon & Quek, 2013). For example, a study was conducted to investigate the development of soft skills from the perspective of 100 undergraduate engineering students at one public university in Malaysia (Aziz, Khatimin, Mastor, & Zaharim, 2012). These students were required to self-assess their achievement in communication and problem solving skills. The researchers reported that students perceived these soft skills as increasing from year to year. The study found that students perceived that the transformed engineering education had a positive impact on the development of soft skills. The findings of this study lead to further questions about how teaching and learning within the new curriculum is managed to address these soft skills. There needs to be investigations of how educators conceptualise soft skills, and how they perceive teaching soft skills in their courses, particularly in English language courses. The next section discusses the nature of engineering education and teaching and learning in engineering from an Outcome-based Education (OBE) perspective, an education system which supports the achievement of graduate outcomes.

2.2.2 Outcome-based education in engineering

The engineering curriculum in all higher education institutions in Malaysia has been restructured and engineering programmes have been redesigned to support the achievement of graduate outcomes as required by BEM (Tang, Akir, & Malie, 2012).

Studies that have investigated the implementation of these redesigned programmes have been undertaken largely from engineering perspectives (Mohammad et al., 2012; Affandi, Hassan, Ismail, & Kamal, 2012; Hisyamudin, Mahzan, Azlan, & Kiong, 2012; Paramasivam, Mutusamy, & Tan, 2013; Tang et al., 2012; Wan, Liew, Na, & Idrus, 2013). Mohammad et al. (2012) investigated the implementation of an outcome-based approach to teaching and learning in one engineering university in Malaysia, investigating the institutional contexts including the operational framework of the university; the criteria for the recruitment of educators; professional development provided to, and the resources available for these educators. The criteria for the recruitment of educators, the professional development and the resources were key elements in ensuring the outcome-based education system could be implemented. However, the question this study raised was whether these educators had clear understandings of the graduate outcomes that needed to be achieved. The educators reported that translating, developing, refining and communicating the graduate outcomes into programme educational outcomes, programme learning outcomes and the course learning outcomes were challenging and there were ambiguities that led to varied
understandings of the graduate outcomes. This raises questions about how information about these outcomes is disseminated to educators, particularly educators who teach non-engineering courses such as English.

Questions about the dissemination process in Mohammad et al.’s (2012) study are similar to those explored in another Malaysian study conducted in the same year investigating ambiguities in identifying soft skills in construction management courses. In their investigation, Affandi et al. (2012) surveyed 44 engineering educators from three public universities and found that ambiguities in defining soft skills interfered with their understandings and practices of teaching soft skills in construction management courses. The researchers reported that these varied understandings and mixed perceptions of teaching soft skills impacted on how effectively these soft skills were addressed, causing mismatches between what was required in the engineering industry and what was being taught in the classroom. The researchers argued that disseminating the soft skills through well-defined outcomes was complex and poor dissemination processes were barriers to the achievement of the required soft skills. This raises the need to investigate the dissemination of engineering accreditation requirements and graduate outcomes such as communication and problem solving skills to build knowledge and understanding about how these requirements are disseminated to and perceived by EL educators within this context.

In implementing an outcome-based education, a systematic teaching schedule was developed to ensure that teaching and learning at one technical university in Malaysia addressed the graduate outcomes of the engineering accreditation requirements (Hisyamudin et al., 2012). This schedule monitored whether teaching and learning reflected actual practice in the engineering industry. This schedule was also intended to assist in organising and preparing teaching plans to ensure that the lecture content was appropriate and improvements in teaching and learning could be identified. While this schedule was useful in assisting engineering educators to construct their teaching to address demands in engineering education, research about how English language teaching is positioned in engineering education, in relation to addressing the graduate outcomes and in complying with actual practice in the engineering industry, would be of great value to the field of English language teaching, particularly ESP.

An investigation of how a redesigned engineering course could support the achievement of engineering graduates was conducted in one university in Malaysia (Wan et al., 2013). The course was designed to bring together the application of engineering knowledge and soft skills in solving complex engineering problems. The students in this course were final year civil engineering students who were required to undertake a group project and who were exposed to standard
procedures and documents involved in real life engineering. At the end of the semester, students were assessed through oral presentation. This study reported that the redesigned course improved students’ understandings of engineering knowledge as they learnt relevant knowledge and applied relevant soft skills when conducting the project. In addition, the redesigned course provided the space for integration of engineering knowledge and soft skills. This raises questions, however, about how opportunities for such integration could be provided through English language courses within an engineering context.

The research discussed in this section raises issues about the transparency of the dissemination process, educators’ understandings of the requirements of engineering accreditation, and the impact of these requirements on teaching and learning. These issues were raised in research both on engineering courses and engineering educators’ perspectives. In engineering programmes, there are also non-engineering courses being taught to engineering students, such as English language courses. This raises the question of whether non-engineering educators and teaching and learning of non-engineering courses experience the impact of accreditation in engineering in similar or different ways. Issues related to the ways in which these accreditation requirements are disseminated to non-engineering educators, such as EL educators, and the ways in which the graduate outcomes are developed and transformed into the course learning outcomes of non-engineering courses, need to be investigated.

The implementation of engineering education programmes which emphasise the achievement of graduate outcomes, OBE, and teaching and learning in engineering has placed great emphasis on developing problem solving and communication skills (Yusoff, Omar, Zaharim, Mohamed, & Muhamad, 2012; Talbot et al., 2013; Varwandkar & Deshmukh, 2013). These skills are critical as the work of engineers involves putting ideas across clearly and accurately, and working as a team to meet employers’ demands (Heylen, Smet, Buelens, & Vander Sloten, 2007; Wye & Lim, 2009). The next section reviews research on the implementation of an engineering education curriculum which focuses on achieving these skills.

2.2.3 Problem solving and communication skills in engineering

Research into employers’ requirements for engineering graduates has identified the need for the engineering education curriculum to concentrate on developing problem solving and communication skills. For example, a survey was conducted in a Malaysian context to determine engineering employers’ perceptions of employability skills with 236 employers from engineering industries, government and private agencies (Saad, Robani, Jano, & Majid, 2013). These employers were given a questionnaire requiring them to rate a set of social, business and technical skills, as
well as engineering knowledge that they regarded as the most important. The majority of these employers regarded problem solving as the most important skill that engineering graduates needed to demonstrate. Technical skills were regarded as the second top skill and communication skills were the third top skill that employers looked for after technical skills. Similarly, in another Malaysian survey, soft skills valued by employers when hiring fresh engineering graduates were identified (Zaharim, Ahmad, Yusoff, Omar, & Basri, 2012). Responses to a questionnaire were collected from 301 employers in various engineering industries in a city in Malaysia. These employers identified communication, team work, lifelong learning, professionalism, problem solving and decision making as the skills that they valued in the workplace. Communication skills were valued the most because they were considered as the most influential and required skills that candidates needed to demonstrate. While both studies highlighted communication skills as the soft skills employers sought apart from problem solving skills, English was not identified as the language through which communication skills were demonstrated.

Investigating the importance of skills required in engineering industries from the perspective of engineering graduates is also vital to provide insights about how they perceive their workplace. Passow (2012) examined engineering graduates’ perceptions of the importance of the competencies required by the accreditation body in the USA (ABET). The participants were engineering graduates working with engineering companies within 10 years of graduation. Based on the analysis of questionnaire data, the study reported that communication and problem solving skills were rated as the top clusters of competencies in the engineering workplace although these differed in form depending on the workplace context.

A similar study which investigated the skills highly required in workplaces from the perspective of engineering graduates who had undergone practical training at different multinational and local engineering companies in Malaysia identified that English was essential for communication (Moslehifar & Ibrahim, 2012). The participants reported that limited abilities in English could impede communicating ideas and explanations during meetings and presentations effectively. The findings highlight the increasingly explicit importance of developing English language abilities in engineering.

The demands for problem solving and communication skills as reported in these studies have instigated research into teaching and learning in engineering education that supports the development of these skills (Genco, Hölttä-Otto, & Conner, 2012; Kashefi, Ismail, & Yusof, 2012a, 2012b; Yadav, Shaver, & Meckl, 2010). In measuring students’ problem solving skills, for example, Genco, Hölttä-Otto and Conner (2012) gave problem solving tasks to two groups of engineering
students in the US. The first group consisted of first year students while the second consisted of final year students. The aim of this study was to examine and compare innovation capabilities of these first and the final year engineering students. The researchers evaluated students’ performance in problem solving tasks using five-point metrics. Their analysis revealed that first year students were more creative than final year students although final year students had acquired engineering skills and knowledge. This finding suggests that students’ innovation capabilities may change as they gain engineering skills and knowledge. Although the final year students were able to perform problem solving tasks, their solutions and the way they analyse the problems were limited to engineering contexts. In other words, they were not able to analyse the problems from various perspectives. This raises questions about how problem solving, as well as other soft skills such as communication skills are conceptualised and how teaching and learning should be conducted, not just in engineering specific courses but also in ESP courses related to engineering.

In addressing questions of how problem solving and communication skills should be taught, Yadav, Shaver and Meckl (2010) proposed the use of case studies. These researchers investigated the use of case studies as a technique to teach problem solving. Students enrolled in a mechanical engineering course from two sections (31 students in one group and 42 students in the other) taught by two educators were recruited. Two topics were taught with one topic taught through traditional lecture and the other through case method. Data were collected through pre and post tests to measure students’ understanding of the topics, and a questionnaire. Although there was no significant difference between traditional lecture and case method in terms of conceptual understanding, students reported that case studies provided opportunities for discussions and enabled them to investigate issues from various perspectives.

Another approach that has been advocated as suitable for developing problem solving and communication skills is blended learning (Kashefi et al., 2012a, 2012b). Kashefi, Ismail and Yusof (2012a) examined the impact of blended learning on students’ communication skills. Data were collected from 62 engineering students enrolled in a multivariable calculus course at one university in Iran. Using materials designed for the study, one of the researchers conducted this three-hour course for 14 weeks. A questionnaire was distributed at the beginning and at the end of the semester to assess students’ communication skills. The study provided evidence of improvements in students’ communication skills as well as an increase in their confidence levels. It was unclear, however, that the improvements in communication skills and the increase in confidence levels were related to the use of English. In addition, the measurement of the development of communication skills in this study was based on students’ perspectives, collected through a questionnaire. Further
investigation is required to measure communication skills among students in teaching and learning from the eyes of EL educators through different methods of data collection.

The study by Yadav et al. (2010) above indicated that the ways in which case studies were implemented could differ from one educator to another, and thus, could impact on the results. In the study by Kashefi et al. (2012a), teaching and learning was conducted by one of the researchers who would be able to address issues arising during their research. While both studies showcase the approaches used as promoting the development of problem solving skills, there are questions about how educators understand problem solving and communication skills in engineering and techniques of teaching these skills. Insights into EL educators’ conceptualisation of teaching problem solving and communication skills are needed. In addition, there are also questions about the use of English during discussions in both studies. Thus, there is a need for an investigation of the extent to which English language is used during discussions, regardless of the approach or technique used to develop students’ communication skills.

The research reviewed in this section highlighted communication and problem solving skills as skills sought by engineering employers and the increasing engineering demands for communication skills in English. The demands for problem solving and communication skills in English call for further investigations to provide a deeper understanding of the challenges in English language teaching in developing these problem solving and communication skills for engineering. The next section reviews research on English language abilities in engineering to examine the significance of these abilities in this field.

2.2.4 English language abilities in engineering

English has been acknowledged as the global language for communication in engineering industries (Riemer, 2007). Consequently, engineering programmes in universities are required to produce engineering graduates who can communicate in English effectively and proficiently in contexts such as Malaysia where English has second language status. However, there are several studies reporting that the use of English is challenging for engineering students in Malaysia. Yasin et al. (2010), for example, conducted a study that investigated English language proficiency of civil engineering students at a Malaysian polytechnic. A questionnaire was administered to 171 civil engineering students who had completed their industrial training. Data obtained from responses to the questionnaire provided information about frequency in using English, and their ability to use English during their industrial training. The study reported that English language was not frequently used by students during their industrial training, both in government and private sectors. The findings also showed that students perceived their English language proficiency level was low.
However, with data obtained solely from a questionnaire with students as the source, the study could not draw a firm conclusion that the frequency of using English during industrial training was related to students’ limited proficiency in English. With low levels of English language proficiency, engineering students may avoid using English. Further investigation is required to examine the relationship between levels of English language proficiency and the use of English among engineering students.

The relationship between English language proficiency levels and the use of English was found in a study conducted by Halim, Ahsan and Munir (2012). These researchers examined motivating and hindering factors for engineering students to write their final year project report in English. The participants were final year engineering students from one technical university in Malaysia. A questionnaire that obtained data about students’ self-assessment of their writing skills in English and their learning strategies was collected from 201 participants. The study found that most of the participants did not have major language issues and yet they were reluctant to write their reports in English. The factors that hindered them from writing their reports in English were low confidence levels and limited time. The findings showed that the participants needed more time to understand, select and integrate resources and compose the report in English. This finding indicated that some students may have difficulties in understanding content knowledge in English although their proficiency level is good, suggesting potential challenges for EL educators to integrate content knowledge into English language teaching.

Performing technical oral presentations in English is an integral part of engineering. Radzuan and Kaur (2011) reported that engineering students at one Malaysian public university were required to deliver their technical oral presentations in English as part of graduation requirements. The purpose of their study was to investigate students’ perceptions of using English for these presentations. The researchers conducted focus groups after students had performed their presentations. A total of 44 final year students forming six focus groups were recruited. The findings showed that the participants experienced anxiety during their presentations due to limited technical knowledge and low English language proficiency levels. Further investigations into the challenges in teaching problem solving and communication skills in English in an engineering university can provide insights into how ESL educators manage this anxiety.

One response to this challenge has been the development of technical communication courses designed to meet the need for engineering students to communicate in English in engineering. A survey was conducted to evaluate the effectiveness of such courses at one public university in Malaysia (Nordin, 2013). These courses included Engineering Management,
Laboratory, English for Engineers, Engineering Ethics and Co-Curricular courses. This survey aimed to determine the extent to which technical communication skills developed by engineering students through these courses met the demands of engineering industries. The participants were 28 engineering graduates with one to three years of work experience in various engineering industries. The participants reported technical communication skills as most important because they needed to communicate technical ideas and findings concisely. Most of the respondents identified English for Engineers as the most important course as it enhanced their ability to convey technical ideas in English. The findings also showed that participants suggested English language should be used as the main language when technical communication courses were conducted. This raises questions about how English is used as a medium of instruction in teaching and learning in engineering.

2.2.5 English as the medium of instruction

Globalisation has increased the value of English language in higher education, particularly in Asian countries. In China, for example, language policies have changed from English as one of the foreign languages that could be learnt to English as a compulsory foreign language that must be learnt in schools and in higher education institutions (Chang, 2006). In Malaysia, the language policy experienced a transformation when English, which held second language status, became the medium of instruction (EMI) for science and technology courses in 2005 as part of a push to internationalise higher education (Gill & Kirkpatrick, 2013). This transformation led to the implementation of EMI in engineering courses in Malaysian higher education institutions with the aim of providing a space for enhancing English proficiency through content learning (Ali, 2013a; 2013b). Within this aim, improving engineering students’ proficiency in English was no longer the sole responsibility of ESL educators. Baldauf (2012) argues that when implementing EMI policy, the issue about how languages should be taught needs to be considered. Thus, teaching English through content learning demands that engineering educators acquire pedagogical knowledge of English language teaching, or ESL educators learn about engineering. A question arises about how much knowledge is required for an ESL or engineering educator to teach English through content learning.

In discussing the implementation of EMI in engineering classrooms, several issues emerge from the literature which could affect the effectiveness of this policy. These issues are engineering students’ limited communicative abilities due to their limited proficiency in English (Che Musa, Lie, & Azman, 2012b; Yusoff & Samah, 2013), engineering educators’ understandings of EMI, and the manner in which EMI policy was disseminated (Ali, 2013a; 2013b). In a study to examine the learning of content in English in higher education it was found that the students had difficulties in
understanding the content when lectures were conducted in English (Che Musa et al., 2012b). The authors interviewed 12 undergraduate students in groups on seven occasions. The participants reported that their limited proficiency in English interfered with their understandings of the content although the language used was simple.

Similar findings were reported in a study conducted in Taiwan. Chang (2010) examined the implementation of English as the medium of instruction (EMI) for engineering, management and informatics courses at a private university. Analysis of the results generated from interview and questionnaire data revealed that engineering students with low English listening proficiency levels reported difficulties in understanding lectures. The results also revealed that content lecturers’ English language proficiency levels contributed to these difficulties. In addition, students reported that EMI only helped in English language development but not for content learning. The authors’ conclusions suggest that high level English language proficiency is crucial for both the educators and students to encourage learning among engineering students. This raises questions about the extent to which content knowledge can be incorporated into English language teaching and vice versa.

Another issue related to students’ difficulties in communication in English in engineering contexts emerged from a study which investigated the implementation of EMI at one public university in Malaysia (Yusoff & Samah, 2013). The 48 participants were interviewed individually and in groups. These participants were supervisors or lecturers from engineering faculties, industrial supervisors and industrial training coordinators. The findings indicated that the use of English for communication was dominant in multinational and private agencies. However, students encountered difficulties in performing tasks given by their supervisors due to their limited communicative abilities. Based on their findings, the researchers associated students’ limited communicative abilities with limited use of EMI. The researchers also reported that some of the engineering educators were resistant to the idea of using English in their teaching. One of the contributing factors to this resistance was due to their limited proficiency in English. In addition to the limited proficiency in English, there are also concerns about the extent to which content lecturers are able to address language issues in their teaching. Basturkmen and Shackleford (2015), for example, investigated how two accounting lecturers addressed language issues when teaching accounting to undergraduate business students in New Zealand. Drawing on classroom observation data, the results showed that the accounting lecturers addressed language issues in terms of terminology or vocabulary related to accounting. There was limited evidence that showed the accounting lecturers addressed language development or language proficiency levels. While the intention of the EMI policy is to promote language through content learning, the findings of both
studies above (Basturkmen & Shackleford, 2015; Yusoff & Abu-Samah, 2013) indicate that addressing language issues in a subject-matter classroom such as engineering is problematic.

The limited use of EMI in classrooms could also be due to the absence of a top-down policy to implement EMI in all engineering classrooms. However, the existence of such a policy may not lead to full implementation of EMI. In Ali’s (2013b) study, which investigated EMI in one engineering university in Malaysia, it was found that even with a top-down policy, the implementation of EMI in all engineering classrooms was far from achieving its goals. The findings showed that EMI was unidirectional whereby English was only used by the engineering educators. Students were not expected to interact in English, either with their lecturers or among themselves. As a result, the linguistic environment for students’ English language development was limited.

Although the findings of different studies about the dissemination processes related to the policy are contradictory, the key issue observed in both Yusoff and Samah (2013) and Ali’s (2013b) study was that whether it is through a top-down or bottom-up approach, the implementation of EMI policy is problematic. The factor that could lead to the success of implementing a policy depends on the willingness of an individual to do so. In both studies, it was observed that some engineering educators attempted to implement EMI in their classrooms. Ali (2013b) highlighted this act as individual agency. Further investigation of individual agency in a study which investigates EMI from the perspective of EL educators can provide insights into the factors that either support or impede EMI in specific disciplines.

2.3 Conceptual Framework

This chapter reviewed the literature related to the nature of engineering education in Malaysia, problem solving and communication skills in engineering, English language abilities in engineering, English as the medium of instruction, English language teaching in higher education in Malaysia, English for Academic or Specific Purposes, English for engineering and English as a Second Language (ESL) educators’ professional identities in a discipline-specific context. A number of key issues were highlighted.

First, there is a need to investigate further the implications of engineering accreditation on English language teaching and EL educators’ understandings of accreditation requirements and graduate outcomes. Second, the context of an engineering-based institution requires EL educators who are trained to teach at school and for general purposes to make transitions in their beliefs and their pedagogies in teaching English in higher education institutions. This creates challenges in positioning English language teaching and developing professional identities in engineering
education. Third, questions related to the role of English language courses in developing English language abilities in engineering, as well as in developing problem solving skills and communication skills, were raised. Fourth, the issues around teaching content through English language teaching, and challenges and constraints in developing ESP-type English language courses, need further investigation. These key issues serve as the basis to investigate how EL educators manage the complexities of English language teaching in engineering.

Figure 2-1 presents the conceptual framework that underpins the study. In this framework four key stakeholders are presented. These are the University, engineering authorities, EL educators and students. The review of the literature revealed that there are a range of factors that may impact on how each group of stakeholders understands and experiences English language teaching in engineering in a particular context. These are listed for each stakeholder, for example, the University has to consider graduate outcomes of the Engineering Accreditation Manual (EAM), the outcomes of the learning domains of the Ministry of Higher Education, and the faculty structure, while the factors for EL educators include knowledge and beliefs about English language teaching, EL educators’ professional identities and EL educators’ pedagogies. It is evident from Figure 2-1 that each group of stakeholders considers different factors related to English language teaching and learning and that these factors will impact on their perceptions of what and how English should be taught within engineering. This study focuses on the context where these factors and perceptions intersect which is in English language teaching practice (see Figure 2-1) and explores the complexities and tensions caused by the interactions among these factors that create challenges for EL educators teaching in an engineering context.
Figure 2-1: Factors Impacting Stakeholders’ Understanding and Practices of English Language Teaching and Learning in Engineering.
This study, therefore, investigated the ways in which EL educators managed the complexities of teaching English in an engineering university in Malaysia. The interactions between the nature of English language teaching and engineering education can create challenges and tensions, not only in EL educators’ pedagogies and instructional practices, but also in their conceptualisation of teaching English and in positioning themselves in this context. This study examined the ways that educators make meaning of and position themselves within their institutional context which can help them to relate to the teaching and learning within this context. Taking into account that EL educators teaching in higher education institutions may experience transitions when changing workplace from school settings to adult learning contexts, and from teaching English for general purposes to specific or discipline-specific purposes, this study also examined how this transition impacted on EL educators’ professional identities and how they manage English language teaching. Three research questions guided this study.

1. How is English language teaching positioned in engineering education?
2. What are the complexities of English language teaching in engineering?
3. How do EL educators manage the complexities of English language teaching in engineering?

The next chapter presents the research design and methodology used to answer these questions.
Chapter 3   Methodology

The literature reviewed in the previous chapter highlighted the complexities for English language (EL) educators when teaching English for engineering, revealing that there was limited knowledge about the ways EL educators manage these challenges, particularly in using English to teach soft skills such as problem solving. This chapter presents the research design, methodology and procedures that address this issue. The chapter is divided into three parts. The first part of the chapter presents the aim, the research questions and the study site. The second part presents the research design and the methodology of the study. The third part provides an account of the procedures for data collection which involved three phases. The first phase discusses the pilot study, involving two EL educators from the English Language Department of the study site, and how the pilot study informs the research design and methodology of the main study. The second phase discusses document collection and the distribution and collection of the questionnaire from the EL educators at the study site. The third phase presents the data collected from the primary sources, involving four participants recruited for the main study. The next section presents the aims, the research questions and describes the study site.

3.1   The Aims, Research Questions and Study Site

3.1.1   Aims

This study sought to achieve three research aims. First, this study aimed to explore the positioning of English language courses and the ways in which EL educators positioned themselves in the context of one technical university. Second, this study unpacked the complexities of teaching English language in engineering. Third, this study examined the ways EL educators managed the complexities of teaching English language in engineering.

3.1.2   Research questions

In order to unpack the ways in which EL educators managed the complexities of teaching English in engineering, this study addressed the following research questions:

1. How is English language teaching positioned in the engineering academic curriculum?

2. What are the complexities of English language teaching in engineering?

3. How do EL educators manage the complexities of English language teaching in engineering?
3.1.3 The study site

The primary site for data collection was at one public technical university in the state of Johor in Malaysia. The university was located in a suburb where the use of English language was limited outside of the English language classroom, and rare outside the university community. As this university specialised in technical education, focusing primarily on engineering education, the education policy and structure were not only monitored by the Ministry of Higher Education Malaysia, but also closely by the Board of Engineering Malaysia (BEM). BEM is an agency responsible for ensuring that all engineering programmes in universities in Malaysia achieve the international standard. This agency provides universities with the Engineering Accreditation Manual (EAM) which outlines the graduate outcomes students need to achieve and the requirements engineering programmes need to fulfil to be accredited by BEM. Therefore, in order to achieve accreditation, all the courses at this university, including core English language courses, need to demonstrate achievement of graduate outcomes. Given these requirements, this site was found to be a suitable setting to investigate teaching English within an engineering setting. There were three engineering faculties at this university which included the Faculty of Civil Engineering, the Faculty of Electrical Engineering and the Faculty of Mechanical Engineering. The study took place in the Faculty of Science because this is where the English Language Department is located.

3.2 Research Design and Methodology

In this section, the research design, detailed accounts of data collection and data analysis are discussed. In presenting the research design, it should be noted that the focus of this study shifts from an initial focus on teaching problem solving skills to teaching English for engineering with teaching problem solving skills as part of English language teaching. This shift occurred as an outcome of the piloting phase of the study and is discussed in the section: Piloting the instruments and research methodology.

3.2.1 Research design

This study adopted a case study design because the aim was to investigate in detail the complexities of English language teaching at an engineering university. A case study research design is useful to investigate a phenomenon in its real life context and has the ability to capture the complex nature of the phenomenon being investigated (Cousin, 2005; Johnson & Christensen, 2004; Neuman, 2011; Silverman & Marvasti, 2008; Yin, 2014). Stake (2005) identifies intrinsic and instrumental as types of case studies. Intrinsic case studies explore a specific or unique situation to provide answers to the questions related to that particular situation (Yin, 2011). The purpose is to
provide an understanding of the situation, not for theory building (Stake, 2005). Instrumental case studies illuminate an issue in a particular situation and provide insights on this issue (Creswell, 2012), which can be extended to other situations (Merriam, 2009; Yin, 2011). This study was an instrumental case study as it investigated the issue of EL educators managing the complexities of teaching English, which included teaching communications skills and problem solving skills in English within engineering contexts in a second language setting. The insights obtained from this study can be extended to other disciplines or contexts.

A case study can be a single case or multiple cases. A single case study examines a phenomenon in context at one site while multiple case studies can be about examining a phenomenon in a number of contexts at one site, or in one situation but at more than one site (Baxter & Jack, 2008; Gay, Mills, & Airasian, 2012; Riemer, Quartaroli, & Lapan, 2012; Swanborn, 2010). A single case study captures the circumstances and conditions within real life settings and information obtained can contribute to theoretical building (Stake, 2005; Yin, 2014). Thus, a single case study was appropriate for this study because it captured the ways in which ESL educators positioned and managed the complexities of English language teaching in the context of one technical university to address the research questions.

Conducting case studies can be complex as it involves investigating human perceptions, interactions, activities and decisions (Lodico, Spaulding, & Voegtle, 2010; Riemer et al., 2012). In capturing human perceptions, interactions, activities and decisions in real world settings, the investigation required a naturalistic approach to data collection. In other words, the data collection process did not attempt to intervene or manipulate the phenomenon under investigation (Gay et al., 2012; Patton, 2002). In order to obtain insights related to EL educators’ perceptions, interactions, and activities in teaching English and in managing the complexities of English language teaching within engineering contexts with limited disruption, document studies, interviews, classroom observations and video recordings, and stimulated recall protocols were used (Denzin & Lincoln, 2005; Swanborn, 2010).

In addressing the research questions, a mixed methods approach was employed where the data were collected qualitatively and quantitatively. A mixed methods approach has the potential for providing broader understandings of human activities in a way that neither quantitative nor qualitative methods alone have (Tashakkori & Teddlie, 2010). In this study, the quantitative data were drawn from a questionnaire while the qualitative data were drawn from document studies, interviews, classroom observations and stimulated recall protocols. The quantitative data were used to highlight key issues that needed further investigation, while the qualitative data provided rich
information from various perspectives of English language teaching within the context of one technical university.

When designing mixed methods research, the level of interaction between the two strands, quantitative and qualitative data, should be determined (Creswell & Plano Clark, 2011). Greene (2007) identified two types of interaction which are, (a) independent (research questions, data collection methods and data analysis of both approaches are separate, and the two strands interact when drawing conclusions) and, (b) interactive (the design and methods of one strand depend on the results of the other strand). In this study, the purpose of using the questionnaire was to provide a profile of the ESL educators and a snapshot of English language teaching within engineering at this university to highlight key issues that required further examination. In other words, the results of the quantitative data analysis informed the qualitative data collection and analysis.

Using various data collection methods served as triangulation whereby data which could not be captured by one method could be captured by others (Flick, 2006; Hesse-Biber, 2010; Lichtman, 2010). For example, the document study provided the context for English language teaching in engineering based on the requirements of the engineering industries, the data from the interview with ESL educators provided insights about their perceptions, beliefs and opinions of teaching English within this context and the data from the classroom observation, video recordings and stimulated recall protocols provided insights about classroom teaching within this context. This provided a deeper understanding of the research problem and provided answers to research questions from various aspects.

3.2.2 Data sources

There are two types of data sources involved in conducting research: primary and secondary. Primary sources provide firsthand information about the issue from the people involved in the situation and secondary sources provide a description of the context (Gay et al., 2012). In this study, both primary and secondary sources were used. Primary sources were data obtained through interviews, observations and stimulated recall protocols of the EL educators that provided information about beliefs, knowledge and teaching practices, as well as the ways in which they managed the complexities of English language teaching in engineering. Secondary sources were important because they provided the context for English language teaching in an engineering context. The secondary sources included documents which provided information related to engineering accreditation, engineering education, the university objectives and graduate attributes, and English language curriculum documents which provided data on the structure and the design of
English language courses, the content of these courses and the learning outcomes that needed to be achieved.

3.2.2.1 The EL Educators

This study examined one group of EL educators’ beliefs, knowledge and teaching practices in teaching English within an engineering education setting to unpack the complexities of teaching English in this context and how these EL educators managed these complexities. EL educators for this study were selected by means of purposeful sampling (Byrne, 2001; Merriam, 2009; Yin, 2009). These participants were selected according to their qualifications, years of teaching experience, and their involvement in teaching engineering students when the main study commenced. Based on initial observations during the pilot study, there were EL educators who did not undergo teacher education during their undergraduate education. The pilot study had raised the need to include both EL educators with and without teacher education in the investigation. Examining English language teaching in engineering from various educational backgrounds provided better understanding of the complexities and the ways EL educators managed their teaching.

3.2.2.2 Documents

Documents were collected as they provided an understanding of the setting in terms of the nature of engineering accreditation, the requirements in engineering education, the structure of engineering academic curriculum and nature of the English language courses. They were stable and outside the researcher’s influence (Marshall & Rossman, 2006; Swanborn, 2010). They were also unobtrusive in the sense that they were not influenced by the participants’ or the researcher’s points of view of the issue (Gay et al., 2012). In this study, the documents provided an understanding of the expectations within engineering contexts which created a connection with what was being understood by ESL educators in developing and teaching the English language courses. The details of the documents which were collected are displayed in Table 3-1.
<table>
<thead>
<tr>
<th>Documents Collected for this Study</th>
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<tbody>
<tr>
<td><strong>External</strong></td>
</tr>
<tr>
<td>Engineering Accreditation Council (EAC)</td>
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<tr>
<td>Engineering Accreditation Manual (EAM)</td>
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<tr>
<td>Malaysian Qualification Agency (MQA)</td>
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<td>Malaysian Qualification Framework (MQF)</td>
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<td>University</td>
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<tr>
<td>The University Outcomes</td>
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<td><strong>Internal</strong></td>
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<tr>
<td>Academic Department (AD)</td>
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<tr>
<td>Programme Descriptions for Engineering Programmes</td>
</tr>
<tr>
<td>English Language Department</td>
</tr>
<tr>
<td>The English Language Course Syllabus</td>
</tr>
</tbody>
</table>

The documents from external sources were those received from the Board of Engineers (BEM) and the Malaysian Qualification Agency (MQA). The documents from BEM provide guidelines and procedures for restructuring the engineering academic curriculum at university level.
These documents were directly involved with the engineering accreditation process and were the key to an engineering programme being awarded accreditation. The documents from MQA provide information about the requirements by the Ministry of Higher Education that all university programmes need to fulfil. These documents were not directly involved with engineering accreditation.

The documents from the internal sources were divided into two categories. The documents for the first category were collected from the university management and engineering faculties and were those directly involved in engineering accreditation processes. These documents were produced based on the guidelines in the engineering accreditation manuals. They were used to develop engineering programmes which met the requirements of engineering accreditation. The documents for the second category were not directly related to the engineering accreditation process. They were the English Language Course Syllabus and the English Language Course Outline that provided EL educators with information about the descriptions of the English language courses, the topics and the content for the English language courses, the course learning outcomes, and the assignments/tasks for each course. These documents, which were created by the EL educators at departmental level, were the internal sources as they guided the EL educators’ teaching and learning in engineering contexts.

3.2.3 Data collection instruments

This study employed a mixed methods approach, involving quantitative and qualitative instruments. Multiple data collection instruments were utilised in order to address the demands of the research questions for deep understanding of the problem. These instruments included a questionnaire, semi-structured interviews, classroom observations and video recordings of classroom teaching, and stimulated recall protocols.

3.2.3.1 Questionnaire

A questionnaire was developed to provide an overall picture of the EL educators at the study site and to select the participants for this study. Using a questionnaire enables data involving knowledge or information, values and preferences, and attitudes and beliefs related to a research problem to be gathered (Tuckman & Harper, 2012). In this study, a questionnaire was used due to its suitability to capture a snapshot of the EL educators’ beliefs, perceptions, knowledge and teaching practices, particularly teaching English for a discipline-specific context (Mackey & Gass, 2005). By capturing these data, the researcher was able to profile the EL educators at the study site and recruit the participants for the main study. The data from the questionnaire also informed the
questions and issues that required further investigation to obtain deeper understandings of the issue being investigated (see Appendix C1).

In designing a questionnaire, there are two types of questions that need to be considered. Closed-ended questions are used when the researchers intend to specify relevant responses to a question and to reduce ambiguity in interpreting participants’ responses (Check & Schutt, 2012). Open-ended questions are used when researchers are not able to predict possible answers due to limited knowledge about a topic or issue (Ary et al., 2010). There are several types of closed-ended questions which include scaled items (rate a concept or a statement using words such as always, often, seldom and never), checklists (choose possible answers from the list) and ranking items (rank items according to preferences) (Tuckman & Harper, 2012). Another type of closed-ended question is likert-scale items where participants indicate their preferences of strongly agree, agree, undecided, disagree and strongly disagree (Ary et al., 2010; Check & Schutt, 2012). Likert-scale questions are suitable to measure beliefs, perceptions and knowledge which were subjective (Burns, 2000). In terms of open-ended questions, the fill-in item is commonly used where participants are required to generate their own answer (Tuckman & Harper, 2012).

In the case of this study, the questionnaire was used to gather information about the EL educators’ educational and teaching background, measure their beliefs, perceptions and attitude related to English language teaching, and rate their teaching practices. Therefore, fill-in items were used to obtain data related to educational and teaching background, likert-scale items were used to measure beliefs, perceptions and attitude, and the scaled items were used for EL educators to rate their practices and resources for teaching at this university. For the likert-scale, a forced choice 4-point likert-scale was used to avoid neutral responses which could hinder the researcher to accurately profile the EL educators (Johnson & Christensen, 2004).

3.2.3.2 Interviews

There are two philosophical approaches to conducting interviews: the positivist and the interpretive constructivist approaches. The positivist approach conducts interviews which are highly structured and is an oral form of a written survey, and the data are analysed statistically (Merriam, 2009; Rubin & Rubin, 2005); whereas the interpretive constructivist approach makes meaning out of people’s experiences, opinions and beliefs that are interpreted from in-depth data (Rubin & Rubin, 2005, 2012). This study employed the interpretive constructivist approach to interviewing as its purpose was to obtain in-depth understandings of EL educators’ perceptions, attitudes and beliefs about English language teaching within engineering contexts.
Conducting an interview is a way to access people’s thoughts or points of view or to understand people’s experiences in order to provide explanations about an issue (Kvale, 2007; Silverman & Marvasti, 2008). It helps researchers to obtain important information that they could not gather from observation alone. There are three types of interviews which support the interpretive constructivist approach (Rubin & Rubin, 2005). First, semi-structured interviews are conducted based on pre-determined questions and yet the participants have flexibility in answering these questions (Flick, 2011), and the interviewers have the flexibility of modifying the order of the questions and the details of the questions (Bernard & Ryan, 2010). Second, is the narrative or unstructured interview which does not require pre-determined questions and is commonly used when the researcher aims to learn more about the issue from the interviewee (Merriam, 2009). The third type is the focus group which involves several individuals interacting and contributing their opinions to the question posed by the researcher (Gay et al., 2012). The main aim of this study was to investigate the ways in which EL educators managed the complexities of English language in engineering. Therefore, semi-structured interviews were conducted to elicit information related to this issue. By using semi-structured interviews, the participants were given the flexibility to express their perceptions and beliefs and yet the main aim was achieved (Freebody, 2003; Rapley, 2004).

Using interviews helps to explore the participants’ perceptions of an issue, which cannot be obtained from observations (Hatch, 2002; Miller & Crabtree, 2004). According to Gass and Mackey (2007), interviews can collect three types of data: factual, behavioural and attitudinal. The interviews for this study collected behavioural and attitudinal data. The behavioural data refers to habits and actions which included the teaching practices and strategies the participants used when teaching English to engineering students (e.g., “How do you include teaching problem solving skills in your English language classes?” and “What are your teaching strategies in teaching English to your engineering students?”). The attitudinal data included the respondents’ opinions, beliefs, attitudes and interests in teaching English to engineering students (e.g., “What is your opinion on teaching English to engineering students?” and “How do you feel about teaching problem solving skills in your class?”). The questions posed enabled data to be collected that provided a better understanding of the research questions related to positioning English language teaching, and the ways in which EL educators positioned themselves within engineering education. The interview protocol is provided in Appendix C2.

This study adopted Rubin and Rubin’s (2005) responsive interviewing model because of its flexible design in conducting the interview and yet it enabled the researcher to generate deep understanding of the issue being investigated. This model is not about the stages or steps of conducting an interview. Rather, the model represents the criteria for conducting an interview. In
this model, researchers have the flexibility of developing their own style of conducting an interview. Researchers can have a casual conversation before they start the interview, or simply introduce themselves and go straight to the questions. Next, researchers need to self-reflect their understandings and reactions towards the responses given by their participants. However, researchers need to ensure that their reactions or opinions do not influence what they ask and how they ask the questions. In addition, they also need to continually recheck the appropriateness of their pre-determined questions during the interview process. In the responsive model, researchers need to recognise that each participant reacts to a question differently. Thus, in this study, the researcher was aware of what questions to pursue and what questions to ignore during the interviewing process. In addition, to achieve deep understanding of the issue being investigated the researcher was ready to pose follow up questions when the participants produced new information and to adjust to unexpected situations. Each participant may produce different new information which required the researcher to reconstruct questions during the interview process and for the next interview sessions.

3.2.3.3 Classroom observations and video recordings

Classroom observation is a means of collecting unfiltered data related to human activities which researchers have the privilege to witness (Yin, 2011). This method can be conducted quantitatively or qualitatively. The quantitative approach involves recording classroom incidents using a structured system, such as a scoring and tally system, and the analysis relies on counting and classifying data; whereas a qualitative approach involves recording open-ended, non-numerical data, and the analysis of the data depends on the observers’ accurate interpretations of events (O’Leary, 2014). In understanding the complexity of human activities, classroom observations are conducted in natural, authentic settings (Gass & Mackey, 2007; Lichtman, 2010). This study employed qualitative classroom observations, observing ESL educators’ teaching processes in their natural settings to address the research questions and find answers to the issue of managing the complexities of English language teaching in engineering.

There are three types of qualitative classroom observations: unstructured, semi-structured and highly structured. The unstructured model involves recording logs of events without specific categories to look for, the semi-structured model involves recording selected events based on pre-determined categories and assessment criteria, and the highly structured model involves recording events based on pre-determined performance indicators and rating scales (O’Leary, 2014). For this study, semi-structured classroom observations were employed and the criteria were established to obtain understandings about the complexities of teaching English to engineering students. When
conducting a classroom observation, researchers need to decide on the aspects of classroom activities that they are observing (Lichtman, 2010). Yin (2011) identified criteria that are useful in classroom observations. These criteria are characteristics of the people being observed, the interaction between or among people, the actions taking place and the physical surroundings. Tuckman and Harper (2012) identified students’ attitude and values as being important while Wragg (as cited in O’Leary, 2014) included curriculum and evaluation, and job analysis as major contexts for observation. Curriculum and evaluation refer to how aspects of curriculum are being implemented, while job analysis refers to what teachers spend their time doing in the classroom. In understanding the complexities of teaching English and ways in which EL educators manage their teaching, this study observed the participants’ instructional practices related to teaching English, communication skills in English and problem solving skills, their interactions with their students and the activities conducted in the classroom that provided understandings about English language teaching and learning in engineering. In addition, students’ attitudes and values during the teaching and learning process, and the teaching content were also observed. Based on these criteria, the classroom observation schedule was developed (see Appendix C3).

Another issue that the researcher considered when conducting classroom observations was her role during these observations, either as participant or non-participant observer. For participant observers, researchers take part in the situation being investigated and interact with the participants (Bernard & Ryan, 2010). This role allows researchers to have deeper insights of the issue as they are part of the situation being investigated (Flick, 2011). However, researchers may become attached to the situation and the data collected might be influenced by the researchers’ perspective (Merriam, 2009). Becoming emotionally involved in the situation may risk the danger of bias in terms of understanding the issue being investigated from the researchers’ perceptions or beliefs. For non-participant observers, researchers only observe and record activities without interacting with the participants during the classroom observation (Gay et al., 2012; Lichtman, 2010). In this study, the researcher took the role as non-participant observer to enable her to focus on recording the participants’ classroom activities and to be as “objective and detached” as possible from the issue being investigated (Merriam, 2009, p. 127).

The data from the classroom observations can be recorded either in the form of field notes or recordings (Gay et al., 2012; Lichtman, 2010). In this study, the classroom activities were also video recorded. The purpose of video recording the classroom teaching was twofold. First, selected scenes from the recordings were used for the stimulated recall protocols. Second, the video recordings provided the researcher with more accurate descriptions of the events that had taken place in the classroom (Richards & Morse, 2007). During the classroom observations, the
researcher made notes on the activities conducted, the teaching content, the teaching practices and classroom interactions in relation to teaching English for a discipline-specific context and teaching problem solving skills. These notes helped the researcher to identify the scenes for the stimulated recall protocols.

3.2.3.4 Stimulated recall protocols

Using stimulated recall protocols is a way of obtaining another perspective of the events in the teaching and learning process. It provides an insight into the participants’ interpretation and intentions of an event (Mackey & Gass, 2005). In the case of this study, these events referred to the participants’ pedagogies and instructional practices. Although photos can be used in stimulated recall protocols, using video has a greater influence in encouraging reflections on events that have occurred and in eliciting information (DeWitt & Osborne, 2010). Therefore, this study employed stimulated recall protocols using video clips of the participants’ classroom teaching to provide deeper understandings of the participants’ intentions during their teaching and learning process.

In conducting the stimulated recall protocols, video clips and prompts were used to help the respondents with the process of describing and analysing the events (Gass & Mackey, 2000). This method required the participants to recall, describe, analyse and clarify their actions, which helped to provide insights into the participants’ thought processes while they were teaching to understand their actions (Meijer, Verloop, & Beijaard, 2002; Schepens, Aelterman, & van Keer, 2007). To ensure that rich data could be obtained, the participants were provided with a training period prior to the actual protocols. The instructions and the prompts for the stimulated recall protocols were developed based on Gass and Mackey’s (2000; 2007) guidelines for stimulated recall methodology as this was the first time that the researcher used this method (see Appendix C4). The researcher piloted the protocols for the stimulated recall as well as the instructions and the prompts to enable her to become familiar with the procedure and to ensure she obtained appropriate data during the main data collection period. Gass and Mackey (2007) argued that the stimulated recall protocols should be conducted within 48 hours after teaching and learning while the events were still fresh in the participants’ minds. The pilot study provided evidence that supported this notion.

3.2.4 Data analysis

In analysing qualitative data, Yin argues (2011) there are no specific procedures for analysis but claims that systematic analysis is needed. Frequently, qualitative data researchers go through the process of organising, reading, coding and interpreting data (Marshall & Rossman, 2006). Adopting this process, the researcher first organised all the digital recordings of the interviews, classroom
teaching and the stimulated recall protocols into separate digital files according to the types of instruments. The classroom observation data were organised into a file. Next, the interview and stimulated recall protocols data were transcribed, printed and organised into separate files according to the types of instruments. The documents in digital form were printed and organised according to external and internal sources. The documents from the internal sources were further separated and labelled into documents from the university, faculties and English language departments.

3.2.4.1 Documents

In analysing the documents, the researcher read the documents several times to familiarise herself with the content. While reading, words and phrases that represented information about how engineering programmes and engineering academic curriculum should be designed, and the requirements and the outcomes that should be addressed were highlighted and coded. When coding the data, the researcher needed to bear in mind the research aims and the research questions (Richards, 2005). Bernard and Ryan (2010) identified three types of codes, (a) structural codes, (b) theme codes, and (c) memos. Structural codes describe the physical environment in which the data collection was conducted and the characteristics of the participants. Richards (2005) recognised this as descriptive coding and argued that this type of coding is quantitative in nature. Theme codes refer to the themes which were identified from the data (Bernard & Ryan, 2010), and memos are continuous reflections on the data either during the data collection process or during the analysis process (Corbin & Strauss, 2008; Folkestad, 2008). The type of code used for this process was theme coding, to identify the information that positioned English language teaching from the perspective of engineering industries and engineering education.

3.2.4.2 Questionnaire

The data from the questionnaire were entered into a spreadsheet and analysed using MS Excel. The data were tabulated to obtain basic descriptive statistics in the form of percentages. This helped to profile the EL educators based on their perceptions, their knowledge and their teaching practices.

3.2.4.3 Interviews

All the interview data were analysed using the six-step thematic analysis process outlined by Braun and Clarke (2006). First, the researcher familiarised herself with the data by transcribing the recordings herself. Transcribing the data herself also helped the researcher to better understand her data and develop the themes (Rabiee, 2004; Seidman, 2006). While transcribing, analytical memos were written to provide continuous reflection on the data and to develop initial themes (Corbin &
Strauss, 2008; Folkestad, 2008). Second, the transcriptions were read and reread, and codes which were associated with the research problem and research questions were generated. Third, the codes were sorted and rearranged to develop themes. Fourth, the themes were reviewed and themes which did not have sufficient data to support them were collapsed into larger groups. Fifth, the data under each theme were analysed. Sixth, thematic connections were made, conclusions were drawn and the data analysis chapters were written.

3.2.4.4 Video recordings of observations and observations

The data from the video recordings were used to complement what the classroom observation might have failed to capture. During the classroom observations, the researcher made short notes about the participants’ instructional practices in teaching English, communication skills in English and problem solving skills, and their activities as well as their interactions with their students related to these practices. The time stamps for when these practices occurred were noted to help identify these events in the video recordings for editing purposes. Prior to the analysis process, the video recordings were viewed and, data which were not captured and the scenes which were missed during the classroom observations were noted. The scenes identified were edited and transformed into video clips. These video clips were organised and labelled digitally according to the participants. There were two sets of video clips for each participant. These video clips were used for the stimulated recall protocols.

In the analysing stage, the data from the video clips and the classroom observation schedules were treated the same. When analysing the video clips and the classroom observation schedules, thematic analysis was used to identify the patterns which illustrated the participants’ practices and activities in teaching English, communication skills in English and problem solving skills, which were investigated further during the stimulated recall protocols (Braun & Clarke, 2006). In this study, the data from the video clips and the classroom observation schedules were analysed using Braun and Clarke’s six-step thematic analysis. First the researcher transcribed the video clips and read and reread these transcribed data and the classroom observation schedules to familiarise herself with these data. Second, initial codes from the data were generated. These codes were data-driven as well as theory-driven where questions were raised in the literature review (see Chapter 2), the document study chapter (see Chapter 4) and the questionnaire analysis (see Chapter 5). Third, connections were made among the codes and the themes were identified. Fourth, the themes were reviewed and themes which did not have sufficient data were collapsed. Fifth, the researcher defined what aspects of the data each theme captured and identified the story that each theme
informed. Sixth, the researcher started producing the chapters with the story that she identified in step 5.

3.2.4.5 Stimulated recall protocols

The data from the stimulated recall protocols contained reflections of the participants about teaching based on the selected scenes. These reflections reported the participants’ practices and their decision making in their classrooms in relation to teaching English for an engineering context. In analysing these data, an inductive analysis approach was used. This involved describing the data and drawing out concepts and themes through researchers’ interpretations to obtain insights about a research problem (Jebreen, 2012). In the case of this study, the researcher derived concepts and themes from the participants’ accounts of their teaching which provided insights into their teaching practices and approaches, as well as their decision making in relation to English language teaching in engineering. In analysing data collected through the stimulated recall protocols, Gass and Mackey (2000) developed inductive analysis strategies. These were used in this study to analyse data collected through the stimulated recall protocols. First, the stimulated recall audio recordings were transcribed, read and reread, and segmented into analytical units. Phrases which represented the concepts of teaching problem solving skills, teaching communication skills and teaching English for engineering were identified to form these analytical units. After that, the researcher looked for patterns from the analytical units which addressed the research questions and the aims. Words and phrases to represent these patterns were generated to become the coding categories and the analytical units were sorted according to these categories. Next, emerging themes were identified. Although themes were developed during the analysis of the interview, as well as the classroom observations, themes also emerged from the stimulated recall protocols. Thematic connections were made among the different sets of data and interpretations were constructed.

3.2.5 Ethical clearance

An email was sent to the Dean of the faculty where the EL educators worked, requesting permission to conduct the study. The letter informed the Dean that the study involved a pilot study and a main study. Details about the phases of the study were included. In addition, the researcher also requested the assistance of a technician from the department to assist in video-recording and video editing. A consent form was given to the appointed technician. Next, the researcher submitted an application form for ethical clearance for the study to the School of Education Research Ethics Committee of the University of Queensland (see Appendix A). Upon receiving the approvals, all the EL educators were contacted through email to provide them with information about the research and invite them to take part in the study. The consent forms were also distributed to inform the
participants that they were not compelled to participate and they had the freedom to choose not to participate or to withdraw from the study at any time without penalty.

The study site was the institution where the researcher worked. With this background, the researcher became an insider for this research. An insider researcher assumes a role as a researcher but at the same time is a member of the organisation under investigation (Kanuha, 2000). Being in this position, researchers could experience tensions between their role as researcher and as a member of the organisation when conducting research (Drake, 2010). Thus the research process and the findings for the research could be challenged as being influenced by the insider researcher (Pezalla, Pettigrew, & Miller-Day, 2012). However, Hanson (2013) argues that there are also advantages of researchers being “positioned in close proximity to the researched group being located in a familiar setting, which is also the same work place as their respondents” (p. 391). In the case of this study, the researcher was able to build researcher-participant rapport quickly. The participants, who were the researcher’s colleagues, gave full cooperation and allowed access to their classrooms. Furthermore, they were comfortable in sharing opinions with someone they were familiar with. In addition, the researcher was able to relate to events and situations mentioned by the respondents, which provided deeper insights into the issue under investigation. These advantages are consistent with those identified by Blythe et al. (2013) who reported that being insider researchers helped them with the recruitment and rapport, and they were able to obtain data rich in content.

In this study, the researcher had the advantage of building rapport with, and gaining the confidence of the participants, as they were her colleagues. However, during data collection, she refrained from giving comments about the participants’ opinions. This was to ensure that the data collected were not influenced by her perceptions and beliefs.

### 3.3 Procedures

The data were collected in three phases. The first phase (12 weeks duration) involved the pilot study and reviewing both the data collected and the procedures. The second phase (2 weeks in duration) involved document collection. The third phase (10 weeks in duration) involved arranging the schedule, and conducting individual semi-structured interviews, classroom observations, video recording, selecting the scenes from the video recording and the stimulated recall protocols. These phases are summarised in Figure 3-1.
3.3.1 Phase I: Piloting the instruments and research methodology.

This pilot study was designed to obtain an overview of EL educators’ perceptions and challenges in teaching English which included communication and problem solving skills in engineering contexts. By undertaking this pilot study, the procedures and the instruments could be tested and determined to ensure that the data collected could provide answers to the research questions in the main study. To avoid confusion between the EL educators for the pilot study and the main study, the term “respondents” is used for EL educators involved in the pilot study while the term “participants” is used to refer to EL educators involved in the main study.

The pilot study was conducted over a five week period. In the first week, the respondents were recruited. During this time, the schedule to conduct the data collection was established. A questionnaire was distributed to these respondents and collected the next day. In the second week, the interview sessions were conducted. From the third to the fifth week, the classroom observations,
the video recordings, the stimulated recall protocols and focus group were performed. Feedback from the respondents regarding the procedures was collected at the end of the pilot study.

Prior to entering the study site, the researcher sought EL educators who were still conducting teaching and learning sessions. At the time the pilot study commenced, it was the third last week of the semester. During this time, most of the EL educators were conducting students’ presentations or tests as part of the course work assessment of the courses they were teaching. Two EL educators who were available were recruited and details on the procedures for the pilot study were provided.

Upon receiving confirmation of their consent, arrangements were made to conduct the individual interview sessions, video record the teaching and learning sessions, the stimulated recall protocols and the focus group. Copies of the schedule were made and given to the respondents. As the study commenced, continuous changes to the schedule were made due to participants’ priorities to their professional duties.

Both the respondents of this study were qualified EL educators. However, there were EL educators at the study site who did not undergo teacher training or teacher education. It was decided that recruiting them into the main study would provide richer understanding of the complexities of teaching English at an engineering university from a different perspective.

3.3.1.1 The interview

The interview sessions were conducted after the questionnaire was collected so that the researcher could customise the questions according to the participants’ responses. The study found that the original questions were sufficient for the data collection. There were no major modifications made except for the way the questions were posed. The researcher had a tendency to give options in some of the questions instead of leaving the questions open-ended. For example, “Do you get support from your department or from your colleagues or colleagues from the engineering faculties?” When addressing these questions, the participants would generally provide answers for the last options. In the revised version used in the main study, options were only given one at a time to ensure that the participants addressed each option when possible.

3.3.1.2 Classroom observations and video recordings

The classroom observations and video recordings commenced before the interview sessions were conducted. The week that this study commenced was the only week that the two respondents conducted their teaching and learning as the weeks that followed comprised students’ presentations
as part of their assessment. Two teaching and learning sessions for each respondent were video recorded and the classroom observation sheet was used to collect data. One recorded session was used for the training session for the stimulated recall while the other was for the actual stimulated recall protocols. These two sessions took place in two different classes which were conducted in the same week. During the classroom observations, the researcher made notes on the activities conducted, the teaching content, the teaching practices and classroom interactions in relation to teaching English problem solving skills. These notes were to assist the researcher in identifying the scenes to be used for stimulated recall protocols.

Recording the teaching and learning sessions revealed several issues. These included the location of the cameras, the number of people filming, and the focus of the recording. Using only one camera operated by one technician was found to be appropriate as using more than one camera disrupted the class.

3.3.1.3 The stimulated recall protocols

Initially, the stimulated recall protocols were scheduled two days after classroom observations. However, due to the availability of the teaching and learning sessions, and the need for the interview sessions to be conducted beforehand, the stimulated recall protocols were scheduled one week after the teaching and learning sessions were recorded. This was challenging for the respondents as they had to take some time to recall what they did for some of the excerpts shown to them. This highlighted the importance of conducting the stimulated recall within the time suggested for the main study.

The availability of the respondents was the main constraint in conducting the training and the actual stimulated recall protocols separately. For one respondent, the researcher conducted the training and the actual stimulated recall protocols separately using two sets of excerpts from two different video recordings. For the other respondent, the researcher combined the training session with the actual stimulated recall protocols using excerpts from one recording and the number of excerpts was added. Based on the two experiences, the researcher found that combining the training and actual protocols was sufficient to collect relevant data.

In preparing for the stimulated recall protocols, the video recordings were viewed to identify the excerpts to be used for the stimulated recall protocols. Selecting the scenes for the stimulated recall was challenging. When viewing the video recording, the researcher found that teaching the processes of problem solving were not necessarily in sequence. In addition, the problem solving process might occur during task completion and might not be clearly observed in the classroom.
Thus, the researcher needed to be in the classroom and make notes on activities or events which could lead to the problem solving process. This was done in the main study.

### 3.3.1.4 Focus group

The final process for data collection was the focus group. The researcher acknowledged that two respondents was not an ideal number to conduct a focus group. However, as this was a pilot study, the researcher proceeded with this data collection method.

The two respondents were grouped together and topics were given for them to discuss. In performing the focus group, several issues were raised. The initial arrangement to conduct the focus group was interrupted by the respondents’ availability. As it was towards the end of the semester, the respondents had to address other priorities related to their profession. Thus, the focus group was arranged more than a week after the stimulated recall protocols for both respondents were conducted.

The researcher anticipated the challenge in getting four respondents together at one time to conduct the focus group. From her knowledge of the schedule for the coming semester, when the main study would occur, the researcher found that any potential respondents would need to stay after office hours for them to participate in the focus group. In addition, based on the experience from piloting this focus group, the researcher found that the focus group did not provide new knowledge apart from the data collected from the respondents’ individual interview. These two issues led the researcher to rethink using this method of data collection in the main study.

### 3.3.1.5 Data analysis

Upon the completion of data collection (five weeks), data analysis was carried out and the research methodology was reviewed (6 weeks).

The interview data were transcribed and analysed. Themes that emerged included educational background, teaching experience, conceptions of teaching English, perceptions of their teaching practices, perceptions of teaching problem solving skills, the nature of English language courses, the nature of students, resources and support. The excerpts used for the stimulated recall protocols were also analysed. Themes including teaching approaches, teaching strategies, classroom interactions and challenges emerged. The following sections discuss the findings and discussions based on these themes. The theoretical research framework for the main study is discussed in the main study section.
The two respondents recruited for this study were female EL educators. They shared similar qualifications and they had both taught in schools prior to teaching at this university. However, they differed in terms of the length of their teaching experience. These respondents were given the pseudonym of Lea and Min.

3.3.1.5.1 Educational background and teaching experiences

Lea had a Bachelor of Education in Teaching English as a Second Language and a Master of English as a Second Language (English for Specific Purposes). Both degrees were completed at local universities. Lea had been teaching for 13 years including two years in a secondary school. Out of the 11 years at higher institutions, Lea had taught at a polytechnic for seven years and at the current university for four years.

Min graduated from a local university with a Bachelor of Science with Education (Teaching English as a Second Language). Min had only taught for two semesters and this university was her first posting. The only teaching experience she had prior to this university was a three-month practicum at a secondary school. She also had no experience teaching English within engineering contexts.

Both Lea and Min claimed that they developed their passion for teaching when they were in their undergraduate teacher education programme. This suggested that beliefs about teaching and their identity as an ESL educator were developed during this time.

3.3.1.5.2 Conceptions of English language teaching

Both Lea and Min argued that the education they received was generally to prepare them to teach English for a general purpose and in a school setting. Lea, for example, stated that:

*When we were trained as a teacher, it was teaching English as a second language [TESL] and not about teaching English for specific purposes [ESP]. You need to learn to cater to the needs of students because the university setting is different.* (LeaIntPSR1)

This raised the issue of tensions in English language teaching whereby EL educators would need to transform their knowledge and skills into a setting that they were not trained for. This issue could be related to the transition process raised in the literature review.

Lea had taught in three different settings which required her to teach English for three different goals. In schools, the goal was to ensure that students pass their examinations while in polytechnic, the goal was to enhance students’ ability to speak in the workplace. While teaching at the polytechnic, Lea had taught English for Hotel and Catering, English for Business Management
and English for Engineering. The learning outcomes were set up based on the needs analysis conducted on students. At this university, she found that the English language courses were not as specific as those offered at the polytechnic.

*It doesn’t say that I have to teach technical writing for mechanical engineering.*  
*(MinIntPSR2)*

This indicated that from her perspective, the English language courses were not designed to address the English language needs in engineering contexts. This finding raises the need to further investigate the nature of English language courses at this university.

*I feel grateful because I taught at a polytechnic before so I got lots of books on English for engineering. So, I think I brought that knowledge and the content from the books to teach the students here.*  
*(LeaIntPSR1)*

Lea felt that she brought her teaching experience from her previous educational setting to her current workplace to frame her teaching. She did not experience conflict in having to teach English to address language needs in engineering although the English language courses were not designed for such purposes.

Min expressed differences between teaching at school and at university.

*I think there are different challenges that I have to face. At school, students are forced to learn. English is the compulsory subject, so, they have to score in their examinations to further their studies. At this university, students took English language courses for granted. (For this course that I am teaching) there will be no grades. Either pass or fail. There will be no final exams.*  
*(MinIntPSR2)*

Min’s account indicated that there were changes in her conceptions of teaching when the educational setting changed. She also claimed that students’ motivation in learning English changed according to the goals of learning English. In addition, she highlighted the difference in approach to teaching English in schools and at her university.

*In schools the focus is on the language [language structure and grammar]. Here [at this university] we focus more on communicative competence...we target that the students would be able to communicate effectively in terms of oral and also written communication... more on workplace communication.*  
*(MinIntPSR2)*

This finding suggests that the way EL educators understand and conceptualise their institution could influence the way they conceptualise English language teaching. This finding provided an avenue for investigation in the main study.
3.3.1.5.3 Conceptions of teaching problem solving

The conceptual understanding and perceptions of teaching problem solving skills between the two participants varied. Lea, for example, believed that problem solving skills were about solving language problems such as speaking and pronunciation, or problems students encountered when they were performing tasks. Lea believed that problem solving skills could be taught through English language teaching. Through doing this, students not only enhanced their problem solving skills but also their proficiency in English.

*Let’s say they need to do a project in technical writing. We started with identifying a problem and they need to justify why they think it was a problem. They would try to find information on that problem because they need to create research questions and [a] problem statement. (LeaIntPSR1)*

Lea reported that these problem solving skills were addressed through performing tasks. She also discussed the process of teaching problem solving with the students. During the interview, Lea elaborated that she normally used general issues.

*It is not stated in this syllabus that you need to teach them problem solving skills. (LeaIntPSR1)*

Given that the need to teach problem solving skills was not clearly outlined in the syllabus, the analysis revealed that teaching problem solving skills was dependent on the agency to do so. This finding raises the need to further investigate how EL educators perceived their English language courses and their professional agency to teach problem solving skills.

During the interview, Min indicated that she initially understood teaching problem solving skills as limited to mathematical equations and scientific formula. Therefore, she perceived teaching problem solving skills as irrelevant to English language teaching. With this perception, she reported that she did not incorporate teaching problem solving skills into her instructional practices. However, this understanding and perception changed during the interview.

*I think all of us, not only engineering students, should have problem solving skills because we face different kinds of problems in our real life...[As engineers] they need to decide the best decision [when conducting a project]. So they should have the skills to analyse and then to make an appropriate decision. (MinIntPSR2)*

Here, Min demonstrated a broader understanding of problem solving skills. With this understanding, she started to report teaching problem solving skills.
I think I have implicitly encouraged students to acquire problem solving skills through their project work. By giving them a task, they then have to brainstorm. This could develop their problem solving skills. (MinIntPSR2)

This finding highlighted that the ways problem solving skills were conceptualised could influence EL educators’ instructional practices. Min initially reported that she did not teach problem solving skills when she conceptualised that problem solving involved mathematical and scientific formula. When her understanding broadened, she realised that she actually taught problem solving skills, but implicitly. Lea had an understanding of problem solving skills but did not incorporate engineering issues. This suggested that EL educators’ understandings of problem solving skills and the ways they frame their teaching needed to be examined in the main study.

3.3.1.5.4 Perceptions of the students

During the interview, Lea indicated that English was her second language and she often encouraged her students to use English for interactions. Despite these efforts, Lea found that students were generally reluctant to interact in English.

When we wanted to organise things, they would say that they were [too] shy to speak in English and they did not really know how to speak in English. (LeaIntPSR1)

Apart from their attitude towards using English, students were reported as being passive in their learning.

They don’t discuss with their classmates or group members [when I ask them questions]. They just wait for me to give them the answer. (MinIntPSR2)

These findings raised the complexity of addressing students’ characteristics in relation to being reluctant to use English and to being passive learners and suggested a theme for further investigation in the main study.

3.3.1.5.5 Resources and support

The design of the English language courses was perceived as insufficient to address engineering students’ specific language needs by the participants. Lea, for example, indicated that:

At first, I taught according to the syllabus. Then, I found that the students were not benefiting because I was teaching very generally. So, I started to incorporate my knowledge from my experience teaching at the polytechnic. (LeaIntPSR1)

For Min, she consulted colleagues from engineering departments:
While Lea relied on her previous teaching experience, Min sought support from engineering lecturers to incorporate engineering content or issues into English language teaching although it was not clearly stated in the syllabus that they needed to do so. This provided evidence for efforts to create an environment which would benefit the development of their students’ language learning. This raised further a question about teacher agency for consideration during data analysis in the main study.

3.3.1.6 Implications for the main study

The pilot study provided valuable information to consider for the data collection methods, the procedures and data analysis in the main study. The findings in the pilot study generated new perspectives on the research and transformed the focus of this research from teaching problem solving skills to English language teaching for engineering. Teaching problem solving skills remained part of the research but was not emphasised. In addition, the findings from the pilot study also helped to redesign the data collection and data analysis methods. For data collection, the pilot study had provided a clearer picture about how the researcher should conduct her data collection and the improvements needed for the methodology. For data analysis, several themes emerged from the pilot study which could help the researcher with the analysis and provide deeper understandings of the issue being investigated. The next section discusses Phase II of the study procedures, which involved document collection.

3.3.2 Phase II: Document collection and the survey

3.3.2.1 Document collection

The documents related to engineering accreditation and engineering programmes were collected from the Academic Department. The Academic Department (AD) is the office monitoring all programmes at this university. These documents included the engineering accreditation manual, the Malaysian Qualification Framework and the engineering programme descriptions. In order to obtain these documents the researcher met the Head of the AD to explain the nature of her study and requested permission to obtain the related documents. Similarly, to obtain the documents related to English language courses, the researcher visited the Head of the English Language Department and requested permission.
3.3.2.2 The survey

There were 24 EL educators at the time of the study, including three who were on study leave. As this study involved observing EL educators performing their teaching who were directly involved with students’ learning to address the research questions, the three EL educators on leave were not included in the study. An email containing the details of the study, a consent form and a questionnaire were sent to 21 EL educators.

Twelve EL educators completed and returned the consent form and the questionnaire. The data obtained from these EL educators were intended to profile the English Language Department, to raise key issues that needed further investigations and to select the participants for the main study. These data were not intended for statistical analysis.

The analysis of the questionnaire showed that three of the EL educators did not undergo teacher training and two EL educators (one of them did not undergo teacher training) did not teach engineering students. These two were not considered for the main study. Based on the findings of the questionnaire analysis, four EL educators were identified to participate in the main study (see Chapter 5 for justification).

3.3.3 Phase III: The main study

3.3.3.1 Recruiting the participants

An email was sent to the four EL educators identified, inviting them to participate in the main study and explaining the reasons for their selection. The email also detailed information about the methods and the procedure of data collection. Upon receiving their consent to participate, all four participants were brought together and briefed about the research procedures for the data collection.

3.3.3.2 Conducting the interviews

The semi-structured interviews were conducted individually so that the participants’ responses were not influenced by one another. It was important to investigate individual perceptions of English language teaching and the impact of engineering demands or expectations on their actions and decisions in English language teaching.

Before the session started, the researcher explained that the purpose of the interview was to obtain their beliefs, knowledge and understandings about teaching English at this university. Although these participants were EL educators, as second language speakers, they could be more
verbal in their first language. Therefore, they were given the choice of being interviewed either in English or in Bahasa Malaysia to ensure that the participants’ opinions and knowledge were fully obtained. All of the participants used English to express their opinions with one participant occasionally code switching to Bahasa Malaysia. The interviews were conducted before the first classroom observation of each participant commenced. Each participant was interviewed once for approximately 45 minutes.

3.3.3.3 Conducting the classroom observations and video recordings

Before each class started, the researcher entered the rooms where the classes were to be held at least half an hour early to prepare. The technician appointed had been briefed to focus the video recording on the respondents during the pilot study. Taking into consideration the technician’s feedback and the researcher’s reflection on the pilot study, only one video camera was used and placed at the back of the classroom.

During the observations, the researcher was located at the back of the classroom while making notes in the classroom observation sheet, focusing on the space provided for teaching communication skills in English and problem solving skills in engineering. The classroom observations were conducted twice for each participant and the length of each class was approximately 1 hour and 40 minutes. A total of eight classroom observations were conducted and video recorded.

After each classroom observation, the researcher viewed the video recordings and identified the scenes related to activities, teaching practices and classroom interactions focusing on problem solving skills. These scenes were edited into short video clips to enable the researcher to conduct the stimulated recall protocols smoothly.

3.3.3.4 Conducting the stimulated recall protocol

The stimulated recall protocols were conducted one day after each classroom observation of the respondents was performed. The protocols were also undertaken individually. The pilot study provided evidence that the stimulated recall protocols should be conducted within 48 hours as suggested by Gass and McKay (2000; 2007). The twenty-four-hour gap between the classroom observation and the protocols also allowed the researcher to do the editing to prepare for the protocols.

The first stimulated recall protocols for each respondent started with a training session. One video clip of each respondent’s classroom teaching was shown and the respondents were asked to
verbalise what they were doing and thinking. Prompts were also given to assist the respondents with verbalisation. The purpose of this training session was to familiarise the respondents with the protocols and verbalising their thoughts. When the respondents felt comfortable with the procedure, the researcher then showed the rest of the video clips, one at a time, and prompted the participants to clarify their actions and practices.

The second stimulated recall protocols started with a warm up. Similar to the training session, one video clip was shown and the respondents were required to verbalise what they were doing and thinking. The purpose of this warm up session was to allow the respondents to settle down and exercise their thinking and verbalisation before they started with the actual protocols.

The main focus of the stimulated recall protocols was the content of the participants’ thoughts about their instructional practices in the scenes. Therefore, they were given a choice to express their thoughts either in English or in Bahasa Malaysia or in both. All of the participants expressed their thoughts in English with one participant code-switching occasionally. Each participant underwent two sessions of stimulated recall sessions following each of their two classroom observations. A total of eight sessions of stimulated recall protocols were conducted and each session was audio-recorded.

This chapter presented the aims, research questions, research design and methodology of this study. In the next chapter the discussions on positioning English Language Teaching (ELT) in engineering based on the analysis of the document study are presented.
Chapter 4 Positioning English Language Teaching in Engineering Education

This chapter presents the analysis of how the dissemination process of the engineering accreditation requirements outlined in the Engineering Accreditation Manual (EAM) diffuses the demand for ESP and impacts on the positioning of English language teaching within the engineering education. The analysis of the EAM, the university manuals, the engineering programme descriptions from engineering faculties and the syllabus of English language courses provides insights into how the requirements of the engineering accreditation were adapted, filtered, disseminated and translated at the levels of the university, the engineering faculties and the English Language Department. The Malaysian Qualifications Framework (MQF) developed by the Malaysian Qualifications Agency (MQA) was also examined to understand how the requirements of this framework impact on the development of engineering programmes. The outcomes of the analysis of the EAM, university manuals, programme descriptions and syllabus of the English language courses provide insights into how English language teaching is positioned in engineering education at this university.

This chapter first establishes the context of engineering accreditation, highlighting the complexities of structuring engineering academic programmes. The context of quality assurance through MQF is established, identifying complications in the process of structuring engineering programmes and designing engineering academic curriculum. Next, the chapter discusses the processes of interpreting and translating the graduate outcomes of the EAM caused by imperative of the MQF in developing engineering programmes. Then, the chapter discusses the requirements of the EAM that need to be met when developing engineering programmes. These requirements include the criteria for student enrolment and the design of the curriculum. Examining the context of engineering accreditation and how this is translated into English language courses reveals how English language teaching is positioned in the context of this university.

4.1 Understanding the Complexities of Structuring Engineering Programmes

The analysis of the Engineering Accreditation Manual (EAM) revealed that the Board of Engineers Malaysia (BEM), an engineering professional body, is responsible for maintaining the standard of engineering programmes in Malaysia. The Engineering Accreditation Council (EAC) was established to manage the accreditation process and the EAM was developed to provide
guidelines on the requirements to ensure that engineering programmes and engineering students graduating from these programmes have fulfilled the industry demands for engineering. The outcome of this is that BEM, through EAC, has control over how an engineering programme is structured.

The EAC is a 15-member committee that includes a representative from the Ministry of Higher Education and from the Public Service Department. The remaining 13 members are from engineering industries including BEM, and employers of engineering industries. The expertise and experience of members suggests that the EAC and the requirements to maintain the standard of engineering education are dominated by the engineering market. This market focus has a major impact on the structure of the engineering curriculum at this university.

The impact of accreditation on engineering programmes is complicated by the need for all universities to also meet the education quality requirements set by the Ministry of Higher Education (MOHE). To achieve this, the Malaysian Qualifications Framework (MQF) was developed and the Malaysian Qualifications Agency (MQA) is responsible for monitoring and ensuring that all programmes in higher education meet these requirements. Therefore, while the university needs to address the demands of engineering industries, it also needs to abide by the requirements set by the MOHE. This suggests there is an interplay between the EAM and the MQF when structuring engineering programmes and developing academic curriculum for these programmes. The next section discusses this interplay.

4.2 Translating the Graduate Outcomes into Engineering Education

The Engineering Accreditation Manual (EAM) lists 10 graduate outcomes which engineering students should achieve by the end of their programmes. The Malaysian Qualifications Framework (MQF) also presents the domains of learning outcomes which need to be incorporated into all engineering programmes. The summary of the process of translating the graduate outcomes (EAM) and the domains of learning outcomes (MQF) into the university outcomes, programme educational outcomes (engineering faculties) and course learning outcomes (English Language Department) is presented in Figure 4-1.
Based on Figure 4-1, the graduate outcomes (EAM) and the domains of learning outcomes (MQF) are interpreted and adapted to develop the university objectives at university level, through the Academic Department. The Academic Department is an administrative department which manages the dissemination of requirements for quality assurance and accreditation for all programmes and ensuring that these requirements are fulfilled. This department is also responsible for reviewing and approving applications for new programmes at university level before these applications are submitted to the ministry. In addition, this department is in charge of translating the outcomes outlined in the Engineering Accreditation Manual (EAC/BEM) and the Malaysian Qualification Framework (MQA/MOHE) into the university outcomes. The process of adapting both the graduate outcomes and the domains of learning outcomes at the Academic Department

*Figure 4-1:* The process of translating the graduate outcomes and domains of learning outcomes into course learning outcomes.
level is the first layer of filtering of the engineering accreditation requirements. These university outcomes are then disseminated to all faculties.

At the English Language Department level, the university objectives are provided to the course designers, who are the English language (EL) educators at this department and who may or may not teach the courses they helped develop. Although there is no document to show that the English Language Department is provided with engineering academic curriculum from any engineering faculty, discussions in Chapter 6 (Section 6.2.2) provide some evidence of awareness among the EL educators about the structure of the engineering academic curriculum.

When designing and developing the English language courses, the university objectives were interpreted, adapted and developed further to represent outcomes related to English language teaching. This suggests that the dissemination process of the graduate outcomes and the learning domains passed through an initial process of interpreting, adapting and translating at university level, and then a second layer of interpretation, adaptation and translation at the English Language Department level. This raises double layering questions about the accuracy of mapping the course learning outcomes to the graduate outcomes envisioned in EAM and the domains of learning outcomes outlined in the MQF. The graduate outcomes, the domains of learning outcomes and the university objectives are shown in Table 4-1. Colour codes are used to highlight changes in the organisation and the language used in the university objectives when compared to the graduate outcomes and the domains of learning outcomes. The colours are used to show where the graduate outcomes and the domains of learning outcomes were adapted in the university objectives. For example, pink ( ) is used to mark *ability to communicate effectively, not only with engineers but also the community at large* (in graduate outcomes column) and *communication skills* (in domains of learning outcomes column), and to show how they were adapted and developed into a university objective (*an ability to communicate effectively/use ICT effectively*). By marking these three outcomes for communication skills in pink, the different organisations and the different ways of writing these outcomes were observed. For graduate outcomes, the *ability to communicate effectively, not only with engineers but also the community at large* was placed at number 2, for domains of learning outcomes, communication skills was placed at number 5 and for university objectives, *an ability to communicate effectively/use ICT effectively* was placed at number 3.
**Table 4-1: Graduate Outcomes, Domains of Learning, and University Objectives**

<table>
<thead>
<tr>
<th>Graduate Outcomes (GO) (Engineering Accreditation Manual)</th>
<th>Domains of Learning Outcomes (DLO) (Malaysian Qualification Framework)</th>
<th>University Objectives (UO) (University Policy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students of an engineering programme are expected to attain the following:</td>
<td>Graduates who have:</td>
<td></td>
</tr>
<tr>
<td>1. Ability to acquire and apply knowledge of science and engineering fundamentals;</td>
<td>1. Mastery of body of knowledge.</td>
<td>1. Acquired and are able to apply knowledge of science and engineering fundamentals (fundamental knowledge);</td>
</tr>
<tr>
<td>2. Ability to communicate effectively, not only with engineers but also the community at large;</td>
<td>2. Practical skills.</td>
<td>2. Acquired in-depth technical competence in a specific engineering discipline (technical competence);</td>
</tr>
<tr>
<td>3. Acquired in-depth technical competence in a specific engineering discipline;</td>
<td>3. Social skills and responsibilities.</td>
<td>3. An ability to communicate effectively/use ICT effectively (communication);</td>
</tr>
<tr>
<td>4. Ability to undertake problem identification, formulation and solution;</td>
<td>4. <strong>Values, attitudes</strong> and <strong>professionalism.</strong></td>
<td>4. An ability to use techniques, skills and modern engineering tools necessary for engineering practice and easily adaptable to industrial needs (adaptability);</td>
</tr>
<tr>
<td>5. Ability to utilise systems approach to design and evaluate operational performance;</td>
<td>5. <strong>Communication, leadership and team skills.</strong></td>
<td>5. An ability to identify problems, create solutions, innovate and improve current practices (problem solving);</td>
</tr>
<tr>
<td>6. Understanding of the principle of design for suitable development;</td>
<td>6. Problem solving and scientific skills.</td>
<td>6. An understanding of professional and ethical responsibilities and commitment to the community (ethics);</td>
</tr>
<tr>
<td>7. Understanding of professional and ethical responsibilities and commitment to them;</td>
<td>7. Information management and lifelong learning skills.</td>
<td>7. A recognition of the need for, and an ability to engage in, life-long learning - adaptability to new situations and demands by applying and/or updating knowledge and skills (life-long learning);</td>
</tr>
<tr>
<td>8. Ability to function effectively as an individual and in a group with the capacity to be a leader or manager;</td>
<td>8. Managerial and entrepreneurial skills.</td>
<td>8. An ability to function effectively in groups in ways that contribute to effective working relationships and the achievement of goals both as a leader as well as an effective team player (team work);</td>
</tr>
<tr>
<td>9. Understanding of social, cultural, global and environmental responsibilities of a professional engineer;</td>
<td></td>
<td>9. An ability to have an international perspective on social, cultural, global and international responsibilities of a professional engineer and the need for sustainable development (social awareness);</td>
</tr>
<tr>
<td>10. Recognising the need to undertake life-long learning, and possessing/acquiring the capacity to do so.</td>
<td></td>
<td>10. An ability to appreciate aesthetic values through development and applications of personal judgement (appreciation of aesthetic values).</td>
</tr>
</tbody>
</table>
Based on Table 4-1, the graduate outcomes and the domain of learning outcomes were adapted and translated into university outcomes in multiple ways; first, through changing the organisation of the graduate outcomes and domains of learning outcomes in the university objectives and second, through changing the words used in these objectives. For example, *ability to communicate effectively* is placed at number two for graduate outcomes (GO2), number five for domains of learning outcomes (DLO5), and number three for university objectives (UO3) (see colour code □). It was not clear, however, if this organisation was based on priority and if by placing the outcome *an ability to communicate effectively* as UO3 instead of UO2 indicated that this outcome was less important in the context of this university. The way GO2 is written demonstrates the need to “communicate effectively” in engineering community while the way UO3 is written indicates “communicate effectively” without specifying the contexts and that the use of ICT is required.

In the context of English language teaching, it could be concluded that GO2 has positioned English language teaching as ESP, particularly for engineering. However, neither the GO2 nor the UO3 (not even in DLO5) stated clearly that English was the language required for the ability to communicate effectively. In other words, English was not explicitly articulated as the language to be used when learning about communication skills in any of the outcomes. This suggests ambiguities in the roles of English language and English language teaching for communication in engineering fields. The words used in the UO3 have also shifted the contexts of communication from specific (engineering) to general.

There are university outcomes (UO1 *acquired and are able to apply knowledge of science and engineering fundamentals* and UO3 *in-depth technical competence in a specific engineering discipline*) which are written almost the same way as the graduate outcomes (GO1 *ability to acquire and apply knowledge of science and engineering* and GO2 *acquired in-depth technical competence in a specific engineering discipline*) (see colour code □). The use of exact words may reduce ambiguities in interpreting the outcomes intended by EAM and are only used for outcomes related to engineering. This suggests that the university needs to ensure the achievement of the outcomes related to engineering as required for engineering accreditation while allowing flexibility for other outcomes. In addition, *acquired and are able to apply knowledge of science and engineering fundamentals* is placed as the first outcome for both GO and UO. This organisation suggests that high priority in achieving outcomes related to engineering knowledge is given as the university needs to strictly fulfill the requirements of engineering accreditation.

There are graduate outcomes which have been combined together and developed as one university objective, but the intentions of the two original outcomes are not clearly stated in the university objectives (GO5 *ability to utilise a systems approach to design and evaluate operational
performance and GO6 understanding of the principles of design for suitable development ↔ UO4 an ability to use techniques, skills and modern engineering tools necessary for engineering practice and easily adaptable to industrial needs) (see colour code □). While most of the domains of learning outcomes (DLO) can be identified in the university objectives, DLO8 managerial and entrepreneurial skills is not clearly stated in any of the university objectives. The changes in the organisation and the words used in most of the university objectives raise several questions about, ambiguities in the university objectives at the English Language Department level, the impacts of these ambiguities in positioning English language teaching in engineering education, and in developing the type of English language courses that meet the requirements of engineering accreditation. The issue of ambiguities in the university objectives is discussed in a later section of this chapter (Section 4.4) while the impacts of these ambiguities in positioning English language teaching and developing English language courses are discussed in Chapters 6, 7 and 8. In addition, there is also no document which showed that the requirements of engineering accreditation, particularly in terms of the engineering academic curriculum, have been disseminated to the English Language Department. The absence of this document, which is discussed later in this section, raises questions about whether the English Language Department was provided with the information about the requirements of engineering accreditation and the engineering academic curriculum. These questions are discussed in Chapter 6 (Sections 6.1 and 6.2.2).

At the engineering faculty level, the academic curriculum is designed based on the requirements in the EAM and the MQF, and the programme educational outcomes (PEO) and programme learning outcomes (PLO) are developed based on the graduate outcomes and the domains of learning outcomes. The programme educational outcomes are outcomes which graduates are expected to achieve within seven years of graduation in their career and professional life while the programme learning outcomes are the outcomes which graduates are expected to achieve upon graduation. In other words, students should be able to apply the knowledge and skills they learnt and developed during their study to their workplace. This process provides another layer of dissemination of the requirements of engineering accreditation and the graduate outcomes. Table 4-2 shows the cross-referencing of the university objectives and the programme educational outcomes. Colour codes are used to illustrate the existence of the adapted graduate outcomes in the programme educational outcomes. By using the colour codes, the different ways of writing the outcomes, from the university objectives to the programme educational outcomes of the three engineering faculties, can be seen.
Table 4-2: Cross Referencing the University Objectives (UO) and the Programme Educational Outcomes of (PEO) of Engineering Faculties

<table>
<thead>
<tr>
<th>UO</th>
<th>Graduates who have:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Acquired and are able to apply knowledge of science and engineering fundamentals (fundamental knowledge);</td>
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<tr>
<td></td>
<td>2. Acquired in-depth technical competence in a specific engineering discipline (technical competence);</td>
</tr>
<tr>
<td></td>
<td>3. An ability to communicate effectively/use ICT effectively (communication);</td>
</tr>
<tr>
<td></td>
<td>4. An ability to use techniques, skills and modern engineering tools necessary for engineering practice and easily adaptable to industrial needs (adaptability);</td>
</tr>
<tr>
<td></td>
<td>5. An ability to identify problems, create solutions, innovate and improve current practices (problem solving);</td>
</tr>
<tr>
<td></td>
<td>6. An understanding of professional and ethical responsibilities and commitment to the community (ethics);</td>
</tr>
<tr>
<td></td>
<td>7. A recognition of the need for, and an ability to engage in, life-long learning - adaptability to new situations and demands by applying and/or updating knowledge and skills (life-long learning);</td>
</tr>
<tr>
<td></td>
<td>8. An ability to function effectively in groups in ways that contribute to effective working relationships and the achievement of goals both as a leader as well as an effective team player (team work);</td>
</tr>
<tr>
<td></td>
<td>9. An ability to have an international perspective on social, cultural, global and international responsibilities of a professional engineer and the need for sustainable development (social awareness);</td>
</tr>
<tr>
<td></td>
<td>10 An ability to appreciate aesthetic values through development and applications of personal judgement (appreciation of aesthetic values).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PEO</th>
<th>Mechanical Engineering (ME)</th>
<th>Civil Engineering (CE)</th>
<th>Electrical Engineering (EE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The faculty has underlined the following long-term objectives for all its programmes to produce:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Graduates with the ability to professionally practice knowledge and skills in mechanical engineering in a global marketplace and develop specialised interest in related areas;</td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td>Graduates with the competence to formulate and solve engineering problems through analytical and innovative approaches, individually as well as in a team;</td>
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<tr>
<td>3.</td>
<td>Graduates with the ability to communicate effectively, lead and appreciate entrepreneurship while being aware of ethical and environmental responsibilities;</td>
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<td></td>
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<tr>
<td>4.</td>
<td>Graduates with strong commitment for self learning and continuous professional development.</td>
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<tr>
<td></td>
<td>To produce Civil Engineers who are:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Knowledgeable and technically competent in civil engineering discipline in-line with the industry requirement;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Effective in communication and demonstrate good leadership quality in an organisation;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Capable to solve civil engineering problems innovatively, creatively and ethically through sustainable approach;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Able to demonstrate entrepreneurship skills and recognise the need of life-long learning for successful career advancement.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Within 5 years of obtaining a Bachelor’s degree in Electrical Engineering, a graduate is expected to achieve as an:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Engineer who can build a career in electrical and electronic engineering at national and international level;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Engineer who is competent, competitive and capable of pursuing lifelong learning in electrical and electronic engineering;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Engineer who contributes their expertise to the industry, professional body and society.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
According to Table 4-2, there are only four programme educational outcomes for Mechanical Engineering and Civil Engineering while there are only three programme educational outcomes for Electrical Engineering. Some of the university objectives were collapsed while others were not explicitly evident in these programme educational outcomes. For example, UO1 *acquired and are able to apply knowledge of science and engineering fundamentals* and UO2 *in-depth technical competence in a specific engineering discipline* were combined together and translated into PEO(CE1) *knowledgeable and technically competent in civil engineering discipline in-line with the industry requirement* and a part of PEO(EE2) *engineer who is competent* (see colour code □). The way it is written has changed to make the outcomes more concise and the context is specified for a particular discipline. There are two university outcomes which are not evident in the programme educational outcomes (UO4 and UO10). In addition, there are programme educational outcomes which have been translated from the domains of learning outcomes (ME3 and CE4). This adaptation and translation of the graduate outcomes and domains of learning outcomes into the programme educational outcomes instigate ambiguities in understanding the graduate outcomes envisioned by EAC/BEM. These ambiguities are examined when the course learning outcomes of the English language courses are discussed later in this section.

The analysis of the programme learning outcomes (PLO) revealed that the university objectives were adapted and translated into outcomes which suit each engineering faculty. In other words, the language used described specific outcomes for a specific engineering discipline, for example, PLO(ME1) *acquire adequate knowledge and technical competency in mechanical engineering and its related discipline* which is specified into mechanical engineering (see Table 4-3 colour code □). This suggests that all courses within this programme need to be contextualised for mechanical engineering, positioning English language teaching as ESP, contextualised for mechanical engineering. In analysing the data in this table, colour codes are used to map the original wordings and organisation of the university objectives and the wordings and organisation used in the programme learning outcomes of engineering programmes.
<table>
<thead>
<tr>
<th>Cross Referencing the University Objectives and the Programme Learning Outcomes (PLO) of Engineering Faculties</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>UO</th>
<th>PLO</th>
<th>ME</th>
<th>CE</th>
<th>EE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
<td>Acquired and are able to apply knowledge of science and engineering fundamentals (fundamental knowledge);</td>
<td>Acquire and apply knowledge of sciences and engineering fundamentals in civil engineering field;</td>
<td>Acquire and apply knowledge of mathematics, sciences and engineering fundamentals in electrical and electronic engineering field;</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
<td>Acquired in-depth technical competence in a specific engineering discipline (technical competence);</td>
<td>Demonstrate comprehensive technical expertise in civil engineering;</td>
<td>Acquire comprehensive technical expertise in electrical and electronic engineering;</td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
<td>An ability to communicate effectively/use ICT effectively (communication);</td>
<td>Communicate effectively both in written and spoken forms with engineers, other professionals and community;</td>
<td>Communicate both in written and spoken forms with engineers, other professionals and community at large;</td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
<td>An ability to use techniques, skills and modern engineering tools necessary for engineering practice and easily adaptable to industrial needs (adaptability);</td>
<td>Identify, formulate and provide creative, innovative and effective solutions to civil engineering problems;</td>
<td>Identify, formulate and provide creative, innovative and effective solutions to electrical and electronic engineering designs and practices;</td>
</tr>
<tr>
<td>5.</td>
<td>5.</td>
<td>An ability to identify problems, create solutions, innovate and improve current practices (problem solving);</td>
<td>Function individually or in teams effectively with a capacity to be a leader;</td>
<td>Function effectively individually or in teams with the capacity to be a leader;</td>
</tr>
<tr>
<td>6.</td>
<td>6.</td>
<td>An understanding of professional and ethical responsibilities and commitment to the community (ethics);</td>
<td>Recognise the need for, and to engage in, life-long learning and professional development.</td>
<td>Recognise the need for, and to engage in, life-long learning and professional development.</td>
</tr>
<tr>
<td>7.</td>
<td>7.</td>
<td>A recognition of the need for, and an ability to engage in, life-long learning - adaptability to new situations and demands by applying and/or updating knowledge and skills (life-long learning);</td>
<td>Self motivate and enhance entrepreneur skills for career development.</td>
<td>Develop and display entrepreneurship skills for career development;</td>
</tr>
<tr>
<td>8.</td>
<td>8.</td>
<td>An ability to have an international perspective on social, cultural, global and international responsibilities of a professional engineer and the need for sustainable development (social awareness);</td>
<td>Understand and commit professional and humanity obligations ethically in accordance with the engineer’s code of conduct;</td>
<td>Committed to professional, social, ethical and humanity responsibility;</td>
</tr>
<tr>
<td>9.</td>
<td>9.</td>
<td>An ability to appreciate aesthetic values through development and applications of personal judgement (appreciation of aesthetic values);</td>
<td>Realise and demonstrate effective leadership responsibility.</td>
<td>Appreciate and demonstrate effective leadership responsibility;</td>
</tr>
<tr>
<td>10.</td>
<td>10.</td>
<td>Within 5 years of obtaining Bachelor’s degree in Electrical Engineering, a graduate is expected to achieve as an:</td>
<td>Use necessary skills, techniques and modern engineering tools to design and evaluate electrical and electronic engineering practice;</td>
<td>Appreciate the principle of design in electrical and electronic engineering for sustainable development.</td>
</tr>
</tbody>
</table>
Based on Table 4-3, all the university outcomes were adapted into the programme learning outcomes (PLO) of the Electrical Engineering programme. The UO10 an ability to appreciate aesthetic values through development and applications of personal judgement was not evident in any PLOs of the Mechanical Engineering programme (see colour code □) while the UO4 an ability to use techniques, skills and modern engineering tools necessary for engineering practice and easily adaptable to industrial needs (see colour code □) and UO10 (see colour code □) were not explicitly adapted into any PLOs of Civil Engineering. All the engineering programmes included an outcome on leadership (ME7 recognise the importance of entrepreneurship in mechanical engineering and its related discipline, CE7 self motivate and enhance entrepreneurship skills for career development and EE7 develop and display entrepreneurship skills for career development) which is not found in the university objectives, but is found in the domains of learning outcomes of the Malaysian Qualification Framework (see colour code □). A number of the university outcomes were developed into specific engineering discipline outcomes. For example, an ability to identify problems, create solutions, innovate and improve current practices was developed into “...improve current practices in mechanical engineering”, “...civil engineering problems” and “...electrical and electronic engineering designs and practices”. When examining the language to translate university objectives communicate effectively/use ICT effectively (UO3) into the programme educational outcome (PEO) or programme learning outcome (PLO), it was found that the words did not indicate communicative abilities for engineering in the PEO while the phrase “communicate effectively .... with engineers” was found in the PLO of Civil Engineering and Electrical Engineering. Within this context, English language teaching has been positioned as ESP, particularly for engineering. This raises questions about how the demands for ESP are recognised at the English Language Department level. These questions are addressed later in this chapter and in Chapter 6.

The analysis of course learning outcomes of the English language courses revealed that each course only addressed three to four university objectives. When this finding was queried with the Academic Department, it was found that all courses only needed to address three university objectives. It was not clear how this information was disseminated as there was no document which stated this requirement. This requirement was decided at university level, through the Academic Department. The department acknowledged that by addressing no more than three objectives, each course could be designed to focus on these selected objectives comprehensively. At the end of an engineering programme, each course would play a role in contributing to the achievement of all of the university objectives. It was also not clear if the three (or four) objectives were assigned by the Academic Department, or were chosen by the English language Department. This practice reveals
another layer of the dissemination process where the outcomes were being filtered before they were translated into course learning outcomes of the English language courses.

When analysing the course syllabus, the university objectives which were salient and relevant to English language teaching were found in the course learning outcomes of the English language courses. This suggests a further diffusion of the requirements caused by another layer of the dissemination process, before the course learning outcomes are developed. These university objectives are an ability to communicate effectively (UO3), recognition of the need for, and an ability to engage in life-long learning (UO7) and an ability to function effectively in groups in ways that contribute to effective working relationships (UO8). These university objectives were developed into the learning outcomes of each English language course as illustrated in Table 4-4. However, there were differences between the ways these learning outcomes were written at the English Language Department level and the learning outcomes found in the documents obtained from engineering faculties regarding the outcomes that English language courses needed to achieve. For example, the Mechanical Engineering faculty recorded in their curriculum document that the Academic English course should address the first programme learning outcome (PLO1) which required students to acquire and apply knowledge of science and engineering fundamentals. This suggested that EL courses should be designed to provide a space for students to learn engineering fundamentals in English language classrooms. However, none of the course learning outcomes of the Academic English produced at English language Department level explicitly addressed PLO1. The process which led to the occurrence of these differences was not evident because the development of the learning outcomes at English Language Department level and the expected learning outcomes indicated in the documents of engineering faculties were compiled separately. These differences raise the potential for disconnection between the expectations of engineering faculties and the design of the English language courses. A more detailed discussion about these differences between the course learning outcomes and the expectations of engineering faculties is presented in the discussion on positioning the English language courses later in this chapter.

4.3 Structuring Engineering Programmes

The structure of the engineering programmes at this university was guided by the Engineering Accreditation Manual. The analysis showed that there were five criteria that an engineering programme should address in order to be accredited. These criteria were (a) the academic programme (curriculum, syllabus, laboratory work, industrial training and project work), (b) academic staff recruitment, (c) students’ enrolment, (d) learning facilities and (e) quality management system. Two of these criteria were relevant to this study with regard to situating
English language courses within engineering education. These requirements were related to the criteria for student enrolment and the content and design of an engineering academic curriculum. This section discusses the analysis of the criteria for student enrolment and academic curriculum.

4.3.1 The criteria for student enrolment

The Engineering Accreditation Manual (EAM) indicated that students who were to be admitted into an engineering programme needed to have a good understanding of mathematics and physical sciences. The same clause, however, was not used as a requirement for English language proficiency in the manual. In other words, strength in English language abilities at entry level was not emphasised. Thus, students who enrolled at this university could be high achievers in science and mathematics but with limited proficiency in English. The lack of emphasis on English language performance at entry level is inconsistent with the demand for communication skills in English in engineering industries. This inconsistency creates ambiguities in understanding the requirements of the engineering accreditation in relation to the focus of English language teaching. Engineering graduates are expected to develop communication skills in English for engineering within their four years of study and yet they may begin their studies with limited proficiency in English. This inconsistency has the potential of diluting the demand for ESP.

At this university, the student enrolment committee has established the minimum requirement for candidates to have a pass in English in the national examination at secondary school level, and a Band 1 in the Malaysian University English Test (MUET) at entry level. MUET was a compulsory test for candidates to enter higher institutions whereby Band 1 is the lowest and Band 6 is the highest score. Students must reach the minimum requirement of Band 3 to graduate. This means that students who enrol in a programme with a band lower than Band 3 are required to sit the test again during their undergraduate education until they achieve a Band 3. This requirement means that English language teaching at this university not only needs to address the ability to communicate in English for engineering contexts but also develop students’ English language so that they can perform well in MUET. This has the potential to create tensions in terms of the focus of English language teaching and the type of English language courses that need to be developed within the context of this university.

The low requirement for English language proficiency at entry level suggests that there may be students who excel in subjects related to engineering but whose English proficiency level is low. This raises concerns about designing ESP-type courses which address the language needs in engineering disciplines and simultaneously address the students’ mastery of English and communication skills in English. This also raises questions about how students’ mixed language
abilities are managed so that mastery of English language and communicative abilities in English in engineering can be achieved. These issues are discussed further in Chapters 7 and 8.

The analysis in this section found that students’ limited proficiency as the factor which could create challenges in the focus of English language teaching, impacting on developing ESP courses and ESP teaching. Another factor that could contribute to these tensions is the extent to which the curriculum structure supports the development of these communication skills. The next section presents findings about the curriculum structure outlined in the Engineering Accreditation Manual (EAM) and how it supports English language teaching for engineering.

4.3.2 The criteria for academic curriculum

The analysis of the programme descriptions of the engineering faculties found that the PEO and the PLO of each engineering faculty balance technical and non-technical outcomes where engineering graduates are not only expected to have mastered engineering knowledge, for example, acquire adequate knowledge and technical competency in mechanical engineering and its related discipline (PLO1 of each engineering faculty), but also to function effectively in a team, (PLO5 for each faculty) (see Table 4-3). The analysis also showed that engineering education not only comprised engineering components but also general education components, such as language. This means that engineering education not only equips graduates with knowledge and technical skills about engineering fundamentals, but also develops their soft skills as required by industry. However, there is no explicit information in the programme outcomes in the engineering accreditation manual that the language component should be English. The absence of this explicit information signals that learning English is not a priority in engineering education. This brings up questions about the amount of English taught, and when and how English language is taught within engineering education systems.

According to the EAM, the programme structure of an engineering programme needs to be “consistent with, and shall support the attainment or achievement of” the graduate outcomes (Engineering Accreditation Council, 2007, p. 12). These programme outcomes need to be demonstrated throughout the curriculum of an engineering programme. In other words, courses under the category of general education components such as English language courses also need to demonstrate that the university objectives, the programme educational outcomes (PEO) and programme learning outcomes (PLO) of the engineering faculties are incorporated as well. According to Table 4-3, all engineering faculties highlight the need for engineering graduates to be able to communicate effectively by the time they graduate (see PLO(ME)3, PLO(CE)3, PLO(EE)3) both with the community and also other engineers or team members (see PLO 3 of each faculty).
addition, English has been acknowledged as playing an important communicative function in the engineering field (Patil & Riemer, 2004; Riemer, 2007). Thus, engineering students need to be equipped with the ability to communicate effectively for the engineering field. This suggests the need for English language teaching to focus on English for engineering contexts. However, the lack of explicit references to English in the engineering curriculum raises questions about the role of English in engineering education. This potentially impacts on the design and the content of English language courses, diluting the demand for ESP.

Despite the lack of specification about what the language component should be, English is a university core course whereby English language courses are compulsory for all engineering students at this university. Given that the aim of the university is to produce professional engineers for a global market (Riemer, 2007), it is appropriate that the language component focuses on the English language and that engineering students at this university need to develop their communication skills in English. However, the lack of specification created ambiguities in positioning English language teaching which may diffuse the need for ESP courses and teaching at all levels, particularly at the English Language Department level. The next section discusses how English language courses are positioned in engineering education.

4.4 Positioning English Language Courses

The absence of references to English as the language component for general education has raised questions about the position of English language teaching in engineering education. This absence also raises questions about how English language courses are positioned within the engineering academic curriculum, and how this positioning impacts on the type of English language courses taught at this university.

There are three English language courses designed to fulfil the requirement for the general education components in the engineering academic curriculum. These courses are Academic English (AE), Communication (C) and Technical Writing (TW). While the Communication and Technical Writing are compulsory for all engineering students, Academic English is only compulsory for students who have not yet obtained a Band 3 score on the Malaysian University English Test (MUET) upon admission.

Academic English is taught in the first semester of the first year in the academic curriculum of the engineering programme. This course was designed to improve students’ proficiency in English and provide a learning environment to achieve communicative competence for academic purposes, develop team work and life-long learning. The content included activities which involve
listening, speaking, reading and writing skills. Each skill is addressed for two to three weeks to prepare students for MUET to help students achieve at least a Band 3 to allow them to graduate with proficiency levels required by the university. In this case, English language teaching emphasised language development in terms of English language proficiency and the design of the course emphasised performance of English language for examination purposes. This design has diffused the demand for ESP by the engineering accreditation requirements in order to address the requirements by the university, raising inconsistencies between the engineering accreditation requirements and the university requirements.

The Communication course is a pre-requisite for the Technical Writing course. This course is situated in the second semester of the first year of the engineering programme. It was designed for communicative purposes and the content included communicative events such as writing memos and minutes of meetings, holding meetings, interviews and setting up an imaginary business. These communicative events are common events that can be found in various professions, not only in engineering. In addition, these communicative events were not contextualised for engineering contexts. The learning outcomes which emphasised developing competence for oral and written skills for a wide range of contexts were not intended for language development for engineering contexts. For example, in holding meeting tasks, the activities included discussing setting up and managing a business project. It was not specified that the project should be an engineering project. There was no explicit focus on engineering. Based on this finding, the course could be identified as an ESP course. However, the type of ESP course developed may not align with the type of ESP envisioned by the requirements of the engineering accreditation.

Upon completing and passing the communication course, students then enrolled in the Technical Writing course. This course was offered in the first semester of the second year of the engineering programme. It was designed to introduce students to writing reports and conducting small scale research. Similar to the communication course, this course was also designed for communicative purposes emphasising English language writing competence for specific purposes. The content of the course involved writing a proposal and a research report. The learning outcomes indicated that this course was intended for specific purposes, but not for a specific discipline such as engineering. The learning outcomes and the content were not contextualised for engineering disciplines, nor did they include language discourse specific to engineering. This course may reflect an ESP-type course but may not align with the type of ESP outlined in the EAM.

Table 4-4 shows the cross referencing between the course learning outcomes (CLO) of English language courses and the university objectives as well as the programme learning outcomes.
of all engineering faculties. The programme learning outcomes (PLO) in this table were taken from the engineering programme description prepared by each engineering faculty, indicating that these were the outcomes that English language courses need to address. Colour codes are used to indicate the comparison between specific course learning outcomes of the English language courses and the university objectives, and the programme learning outcomes of the engineering programmes. For example, *to develop English language competence for oral and written in a wide range of contexts* (CLOa), *able to communicate effectively* (UO3) and *communicate both in written and spoken form with engineers, other professional and the community at large* (PLO(EE)3) are highlighted in blue. By highlighting these related outcomes, the differences in the ways these outcomes were written communication could be observed.
Table 4-4: Cross-Referencing the Learning Outcomes of English Language Courses with the University Objectives and the PLOs Assigned to English Language Courses

<table>
<thead>
<tr>
<th>Items</th>
<th>Communication (C)</th>
<th>Academic English (AE)</th>
<th>Technical Writing (TW)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria</strong></td>
<td>No pre-requisite. Compulsory for all students</td>
<td>Compulsory for students who achieved less than band 3 in MUET</td>
<td>Pre-requisite – Communication course. Compulsory for all students.</td>
</tr>
<tr>
<td><strong>Course Learning Outcomes</strong></td>
<td>a) To develop English language competence for oral and written communication in a wide range of contexts. b) To train students in working collaboratively with people of various cultures and professional backgrounds. c) To develop lifelong learning skills for continuous personal and professional development.</td>
<td>a) To develop English language communicative competence for academic purposes. b) To train students to work collaboratively with people of various cultures and professional backgrounds. c) To develop lifelong learning skills for continuous personal and professional development.</td>
<td>a) To develop English language writing competence for specific purposes. b) To develop lifelong learning skills for continuous personal and professional development. c) To train students in working collaboratively with people of various cultural and professional backgrounds.</td>
</tr>
<tr>
<td><strong>University Objectives</strong></td>
<td>UO1: Have acquired and able to apply knowledge of science and engineering fundamentals.</td>
<td>UO1: Have acquired and able to apply knowledge of science and engineering fundamentals.</td>
<td>UO1: Have acquired and able to apply knowledge of science and engineering fundamentals.</td>
</tr>
<tr>
<td></td>
<td>UO3: Able to communicate effectively.</td>
<td>UO3: Able to communicate effectively.</td>
<td>UO3: Able to communicate effectively.</td>
</tr>
<tr>
<td></td>
<td>UO5: Able to identify problems, create solutions, innovate and improve current practices.</td>
<td>UO5: Able to identify problems, create solutions, innovate and improve current practices.</td>
<td>UO5: Able to identify problems, create solutions, innovate and improve current practices.</td>
</tr>
<tr>
<td></td>
<td>PLO1: Acquire adequate knowledge and technical competency in mechanical engineering and its related disciplines.</td>
<td>PLO1: Acquire adequate knowledge and technical competency in mechanical engineering and its related disciplines.</td>
<td>PLO1: Acquire adequate knowledge and technical competency in mechanical engineering and its related disciplines.</td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
<td>PLO5: Perform effectively in team work environment.</td>
<td>PLO3: Communicate effectively using a variety of appropriate mediums.</td>
<td>PLO6: Acquire self-learning and information management capability, enabling life-long learning.</td>
</tr>
<tr>
<td></td>
<td>PLO6: Acquire self-learning and information management capability, enabling life-long learning.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PLO1: Acquire and apply knowledge of sciences and engineering fundamentals in civil engineering field.</td>
<td>PLO1: Acquire and apply knowledge of sciences and engineering fundamentals in civil engineering field.</td>
<td>PLO1: Acquire and apply knowledge of sciences and engineering fundamentals in civil engineering field.</td>
</tr>
<tr>
<td><strong>Civil</strong></td>
<td>PLO3: Communicate effectively both in written and spoken forms with engineers, other professionals and community.</td>
<td>PLO3: Communicate effectively both in written and spoken forms with engineers, other professionals and community.</td>
<td>PLO6: Recognise the need for and to engage in, life-long learning and professional development.</td>
</tr>
<tr>
<td></td>
<td>PLO5: Function individually or in teams effectively with the capacity to be a leader.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PLO1: Acquire and apply knowledge of mathematics, sciences and engineering fundamentals in electrical and electronic engineering field.</td>
<td>PLO1: Acquire and apply knowledge of mathematics, sciences and engineering fundamentals in electrical and electronic engineering field.</td>
<td>PLO1: Acquire and apply knowledge of mathematics, sciences and engineering fundamentals in electrical and electronic engineering field.</td>
</tr>
<tr>
<td><strong>Electrical</strong></td>
<td>PLO3: Communicate both in written and spoken forms with engineers, other professional and the community at large.</td>
<td>PLO3: Communicate both in written and spoken forms with engineers, other professional and the community at large.</td>
<td>PLO3: Communicate both in written and spoken forms with engineers, other professional and the community at large.</td>
</tr>
<tr>
<td></td>
<td>PLO5: Function effectively individually or in teams with the capacity to be a leader.</td>
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</tbody>
</table>

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Table 4-4 reveals inconsistencies between the programme learning outcomes (PLO) the engineering faculties expected English language courses to achieve and the course learning outcomes developed at the English Language Department level. For example, the Technical Writing course was expected to address **Civil(PLO)1 students have acquired and able to apply knowledge of science and engineering fundamentals in civil engineering** (see colour code []). This indicated that the content of this course should be integrated with engineering content. However, this intention was not evident in any of the Technical Writing course outlines. Additionally, none of the course learning outcomes of English language courses explicitly articulated that these courses should address problem solving skills, English language or communication skills for engineering. The expectations that English language courses should be specified for a particular discipline were not made clear to the English Language Department. This creates disconnections between the nature of the English language courses and the graduate outcomes of the EAM and engineering faculties’ expectations. This also raises questions about the type of English language courses that need to be developed and the knowledge that EL educators need to have to teach English for engineering contexts.

The Engineering Accreditation Council (EAC) had not emphasised performance in English language abilities for enrolment requirements and similarly the university had also not set a high English proficiency entry requirement. Students with low English language proficiency levels were able to enrol in an engineering programme as long as they had good results for their science subjects and as long as they had undertaken their MUET, regardless of their results. The graduate outcomes of EAC and the programme learning outcomes of engineering faculties indicated that engineering students were expected to develop communication skills in English for Engineering upon graduation. This means that EL educators are expected to develop communication skills and improve students’ abilities in English language in engineering in the first two years of an engineering programme. This expectation raises questions about how English language teaching can meet the demand for ESP and address students’ low proficiency levels in English simultaneously in three semesters.

In the first two years of their programme, students were provided with general education and skills relevant to engineering contexts, followed by basic engineering towards the end of the second year. This was expected to scaffold students’ learning of more complex engineering fundamentals during their third and fourth years. During the first two years, students were exposed to working in groups, as well as individually, to communicating effectively among group members and lecturers, to holding meetings and discussions, to performing presentations and writing reports in all general education components, specifically in English language courses. In their final year, students
produced a project which required the application of all the knowledge and skills not only of engineering fundamentals, but also of their general education components.

Three issues arise within the context of English language teaching based on the locations of the English language courses in the engineering academic curriculum. First, developing ESP courses for engineering was not possible because the English language courses were situated at locations within the programme where students had not yet learnt the fundamentals of engineering. Second, there was a large gap between the communication and language skills taught during their first three semesters and the requirements for the application of these language skills in their final semester when they undertook their project. Third, although students might have had opportunities to apply knowledge and skills to communicate with group members, hold meetings, do presentations and write reports during this gap or write their final year project, the language that they used during this period may or may not have been English. It was not clearly stated, either in the engineering accreditation manual or in the programme structure of the university, that it was compulsory for students to perform all these tasks in English. Thus, it was not always clear what role English language courses played in meeting the programme outcomes in the Engineering Accreditation Manual. The three issues argued above create challenges in understanding the need for ESP for engineering, in developing ESP courses and in establishing English language teaching as ESP for engineering.

4.5 Towards Establishing English Language Teaching in Engineering Education

A number of the members of the Engineering Accreditation Council (the committee responsible for the Engineering Accreditation Manual and the engineering accreditation process) came from the industrial sector. These engineering industries therefore, exerted a strong influence over the requirements of engineering programmes and all courses within the academic curriculum. This meant that the general education components such as English language courses were also required to address these requirements, specifically with regard to achieving the graduate outcomes outlined in the Engineering Accreditation Manual. However, the need to address these graduate outcomes was not evident in the learning outcomes of the English language courses.

Engineering is a discipline which requires engineers to work as a team to solve both common and complex problems (Malaysian Qualifications Agency, 2011). The Engineering Accreditation Manual outlined 10 graduate outcomes which included the ability to identify and solve problems. This requirement suggested application of engineering fundamentals and the ability to communicate effectively among team members to solve problems. The demands for knowledge application (UO1), communication skills (UO3) and problem solving skills (UO5) are indicated in
the university objectives (see Table 4-1). However, UO1 and UO5 were not explicitly stated in the learning outcomes of the English language courses.

Addressing the demands for knowledge application, communication skills and problem solving skills in the English language courses requires the English language courses to be contextualised to a specific engineering field as indicated by the engineering faculties (see Table 4-4). This means that the English language courses developed need to be ESP courses, specifically for engineering. However, this could not be observed in the learning outcomes or the syllabus of the English language courses. Although the English language courses at this university were meant to be for specific purposes, they were not designed for engineering. The learning outcomes of the English language courses aimed to develop students’ communication skills for general contexts with the expectation that these communication skills could be applied to various contexts or disciplines. Hyland (2002) argued that designing English language courses which were meant to be for a specific purpose, and for a specific context, but turned out to be English language applicable for various contexts, was common in the context of foreign language settings. He argued that this could occur when English language courses were “marginalised as a remedial exercise;” similarly designed to address students’ language problems specifically in their low proficiency in English language (p. 386). In the context of this study, the university requirement for English language performance was low and thus, there would be students who needed to improve their proficiency in English, particularly in preparing them for their MUET to achieve at least a Band 3. This could lead to English language courses being perceived as remedial courses to improve students’ language problems, rather than enhancing students’ abilities in the language for a higher level of English for engineering. This raises the need to investigate how English language courses are perceived by EL educators.

The document on student admissions indicates that the requirement for English language abilities at entry level is minimal. This indicated the need for remedial English courses to improve students’ mastery of English and yet, simultaneously, they are expected to demonstrate effective communication skills in English, not only with the community but also among team members in engineering industries. This created tensions in the focus of English language teaching and challenges in developing ESP courses.

4.6 Conclusion

The need to provide a language learning environment which supports the application of engineering knowledge and the development of problem solving skills and communication skills through English language teaching has left English language (EL) educators with challenging roles.
In addition, the demand for ESP was not made explicit, and the space for EL educators to provide feedback about the challenges of teaching English for engineering was limited. Providing the space for interactions with upper management about the university requirements and engineering faculties’ expectations of English language courses allows EL educators to exercise their agency to provide input about the reality of the English language classrooms (Ollerhead, 2014). This can help these EL educators to make sense of their institutional context and work towards the university and engineering faculties’ understanding of the challenges in teaching English within an engineering context.

The next chapter provides a snapshot of the EL educators at this university and the way they positioned English language at this university.
Chapter 5  A Snapshot of the EL Educators

The previous chapter reported how engineering accreditation and university requirements were adapted into engineering education at this university. The analysis also generated findings about how the graduate outcomes of the Engineering Accreditation Council (EAC) were adapted and translated into university outcomes, and later adapted and translated into university objectives, programme educational outcomes and programme learning outcomes (engineering faculties), as well as course learning outcomes (English language courses). The findings showed that the need to fulfil the requirements for the accreditation process and the graduate outcomes was a top-down process where there was limited agency for responding to these requirements, particularly at the English Language Department level. The organisation of the outcomes and the language used to describe the graduate outcomes was amended at university, engineering faculties and English Language Department levels. This led to ambiguities in interpretation, and the outcomes for learning in English language classrooms differed from the ones envisioned by the EAC. The findings from the previous chapter also revealed how English language courses were positioned within the engineering programme, showing that although English language courses should be developed as English for engineering, the courses were situated in locations within the engineering curriculum where students had not yet learnt the engineering fundamentals. Thus, developing English language courses which integrated with engineering content was not feasible. This chapter moves to considering the roles of English Language (EL) educators in this context.

This chapter presents the profiles of the EL educators at this university obtained from the questionnaire. The analysis of the questionnaire provides information about these EL educators’ backgrounds, their beliefs about English language teaching and their reported teaching practices within the context of the engineering education system. The chapter first reviews the questionnaire analysis process and findings about the teaching qualifications and experiences of EL educators. Next, the chapter analyses these EL educators’ perceptions of their readiness to teach English at higher education institutions by examining their views about their teacher education and teaching experiences. Then, the chapter discusses the EL educators’ beliefs about the design of the English language courses. This provides an overview of how the EL educators perceive the status of English language courses within engineering education. Next, practices in teaching problem solving skills used by EL educators are presented. This provides initial information of EL educators’ understandings of teaching problem solving skills.
The findings presented in this chapter are not to find patterns of beliefs and teaching practices. Rather, the findings provide a snapshot of the EL educators at this university and served as a basis for selecting the participants for this study. Selecting participants for further investigation is reported in the final section.

5.1 Results

The questionnaire contained three sections. The first section gathered information about the EL educators’ teaching qualifications and experiences, and the courses as well as the students that they taught for the semester. The second section obtained data related to EL educators’ perceptions of their preparation for teaching English at higher education institutions, their beliefs about English language teaching and their perceptions of English language courses. The third section focused on EL educators’ preparation to teach English for engineering, the teaching practices that they employed within engineering contexts, and teaching problem solving skills.

Twelve EL educators from the English Language Department from the study site completed the questionnaire. This was half of the total number of English language educators in this department. The EL educators who responded to the questionnaire were coded as Participating EL Educators (PELE) to distinguish them from the remaining EL educators who did not participate in this study. It was important to do this to emphasise that the findings from the analysis did not necessarily represent the whole English Language Department.

The results of the questionnaire analysis are presented using descriptive analysis. The next section presents the findings related to the EL educators’ qualifications and teaching experiences. This section raises questions about the extent to which the EL educators were trained to teach at higher education institutions, and specifically for the context of engineering.

5.1.1 Qualifications and teaching experiences

The analysis of the first part of the questionnaire indicated that the 12 PELEs held a variety of qualifications. While all of them took English language programmes for their undergraduate education, three of the PELEs were not trained to teach English as a language. These PELEs specialised in English Studies and Communication. The majority held a bachelor’s degree in Teaching English as a Second Language (TESL) and English Language Teaching (ELT). Further analysis found that seven of these PELEs held a master’s degree with six in TESL and one in English Studies. One PELE had a doctorate specialising in Applied Linguistics. The PELEs’ teaching qualifications are presented in Table 5-1.
Based on their credentials, the analysis reveals that the majority (nine of the PELEs) were equipped with knowledge and skills for teaching English. However, their credentials did not indicate that they were equipped with knowledge and skills to teach English within an adult learning environment. The review of the literature in Chapter 2 revealed that EL educators in higher education institutions, particularly in Malaysia were generally trained to teach English as a second language for school contexts (Bolitho, 2002; Kabilan & Izzaham, 2008; Ong et al., 2004; Zeichner, 2005). The finding of this analysis support this assertion. This finding raises questions about how EL educators transform their knowledge and skills for school contexts into an adult learning setting.

When analysing the PELEs’ credentials further, it was found that one of the PELEs who held a TESL degree completed his undergraduate teacher education overseas. This potentially brought different understandings of English language teaching from a different culture. There were two PELEs who specialised in English Studies and one in Mass Communication in English. These PELEs were knowledgeable about English as a discipline. However, their qualifications did not ensure that they were equipped with the knowledge and skills to teach the language. The qualifications held by these three PELEs indicated potential challenges for them in the context of this university. While they would need to learn about teaching English language, they would also be expected to address the demands and expectations of teaching English at this university. The literature review raised questions about teaching English for specific purposes or a specific discipline whereby different sets of knowledge were required as teaching was not only about the language but also about other skills such as communication and problem solving skills (see Alexander, 2012; Medrea & Rus, 2012). This led to further analysis of how EL educators drew on their teacher training about teaching English in school contexts and transformed this to teaching language for specific purposes and a specific discipline in an adult learning environment. Further investigation was required in order to understand how these PELEs managed the challenges that they encountered to address the expectations of English language teaching at this university.

In terms of years of teaching experience, the findings showed that the PELEs’ years of teaching experience ranged from one year to more than 10 years. Table 5-2 displays the years of teaching experience and their educational settings.
According to Table 5-2, 10 PELEs had taught in other educational settings and two had taught only in the current university (2 years and below). These two were not trained to teach English. One of these two PELEs specialised in English Studies while the other specialised in Mass Communication. Inclusion of EL educators who had no formal teacher education training and no prior teaching experience in the study provides valuable insights into the complexity of learning to teach English in higher education, specifically in the context of this engineering university.

From the 10 PELEs who had taught in other educational settings, two of them had taught in another higher institution for durations of between six months to one year, while eight had taught at either a primary or a secondary school. Two of these eight PELEs had taught in a primary school (for durations of 4 months and 10 years respectively), one had taught in a primary and secondary school (6 months and 1 year respectively) and five had taught in a secondary school. When moving to another workplace, the PELEs may have experienced transitions in terms of their professional identities and pedagogies, and in their understandings of their new workplace which now involve adult learning environments (see Chapter 2). Understanding their institutional context is vital as it helps them to identify their role and instigates their commitment to achieving the goals of their institution (Boyd et al., 2011). In the process of this transition, they will have brought their previous teaching experience into this new context. The experiences which the PELEs brought into this university could be similar or could vary from one another in terms of the implications for their teaching practices at this university and their understanding of teaching English. These experiences could either support or interfere with their understandings of this new context. How these experiences influenced the PELEs’ beliefs, perceptions and practices with regard to teaching English for the context of this university is examined in Chapter 6. In addition, the PELEs’ understandings of their institution are examined further to shed light on how they perceived their role in addressing the expectations within the context of this university.

When investigating educators’ understandings of their institutional context, questions about whether the length of teaching experience provided better understandings of their institution were also generated. Table 5-2 shows that four of the PELEs had taught in this university for 10 years.
and above, four had taught between two and 10 years, and four had taught for two years and below. On the one hand, the PELEs who had taught for 10 years may have more knowledge and skills teaching English at this university as they had worked within this institutional context longer than other PELEs. On the other hand, the number of years teaching at this university may not necessarily ensure PELEs’ understandings of their institutional contexts. How EL educators’ length of time teaching at this university impacted on their understandings of their institution is examined further and discussed in Chapter 6.

The next section presents the analysis of PELEs’ readiness to teach English at higher institutions.

### 5.1.2 Readiness to teach English in higher education institutions

The previous section profiled the PELEs in relation to their qualifications and teaching experiences in terms of their educational settings and the number of years of teaching experience. In this section, the readiness of these PELEs for teaching at higher institutions is examined. Table 5-3 presents the perceptions of the PELEs about their undergraduate education and teaching experience. The full version of the questionnaire is included in Appendix C1.

Table 5-3: **Perceptions of the PELE’s Undergraduate Education and Teaching Experience**

<table>
<thead>
<tr>
<th>Items</th>
<th>Strongly Agree (4)</th>
<th>Slightly Agree (3)</th>
<th>Slightly Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. My undergraduate education has provided me with a strong foundation to teach English in higher institutions.</td>
<td>50%</td>
<td>41.7%</td>
<td>8.3%</td>
<td>0</td>
</tr>
<tr>
<td>8. My undergraduate education has adequately prepared me to teach English for a specific discipline.</td>
<td>25%</td>
<td>58.3%</td>
<td>16.7%</td>
<td>0</td>
</tr>
<tr>
<td>9. My experiences as an educator have provided me with knowledge and skills to teach English to students within a specific discipline, such as engineering.</td>
<td>50%</td>
<td>50%</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

According to Table 5-3, the majority (91.7%) responded positively towards their undergraduate education regarding their foundation for teaching English in higher education institutions, responding either 3 (slightly agree) or 4 (strongly agree). Only 8.3% did not agree that undergraduate education provided a strong foundation to teach English for higher education institutions. Further analysis of the data revealed that the PELE who disagreed underwent a TESL undergraduate programme. For item 8, 25% of the PELEs responded with 4 and 58.3% responded with 3. This shows that the majority believed that their undergraduate education prepared them to teach English for a specific discipline. Surprisingly, the PELE who indicated that she did not have a
strong foundation for teaching English in higher education institutions responded positively to this item. This raises questions about how an EL educator with this kind of language training and background conceptualises English language teaching in higher education. Further analysis of the questionnaire data revealed that the two PELEs who disagreed for item 8 were the ones who graduated from English studies programmes which did not include teacher education. In addition, the PELE who graduated with a Mass Communication degree slightly agreed that she was prepared to teach English for a discipline-specific context. EL educators’ perceptions of teaching English for engineering are examined and discussed in Chapter 6. In addition, the PELEs also responded with 3 and 4 to report that their teaching experiences assisted them in teaching English for a specific discipline. The questions about how they drew on their teaching experiences to teach English for engineering are also investigated in Chapter 6.

While overall the PELEs were positive about their undergraduate education and their teaching experiences, there were questions that were raised about how they translated their undergraduate education and their teaching experiences into teaching of English in higher education and an engineering context.

5.1.3 Understanding EL educators’ beliefs about English language teaching

Beliefs about English language teaching are believed to have great influence on EL educators’ teaching approaches and practices (Borg, 2006). These beliefs serve as guidelines for EL educators in constructing their teaching. Table 5-4 below shows the PELEs’ beliefs about English language teaching.

<table>
<thead>
<tr>
<th>Items</th>
<th>Strongly Agree (4)</th>
<th>Slightly Agree (3)</th>
<th>Slightly Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. ESL educators should teach grammatical rules in order to become fluent in the language.</td>
<td>50%</td>
<td>50%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11. ESL educators should encourage language production among their students</td>
<td>75%</td>
<td>25%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12. ESL educators should correct students’ errors in their language production either in oral or in written form although the message conveyed could be understood</td>
<td>58.3%</td>
<td>33.3%</td>
<td>0</td>
<td>8.3%</td>
</tr>
<tr>
<td>13. ESL educators should have full control of what students need to do and achieve and the knowledge that students should learn.</td>
<td>41.7%</td>
<td>41.7%</td>
<td>16.7%</td>
<td>0</td>
</tr>
</tbody>
</table>
Based on Table 5-4, 50% of the PELEs strongly agreed while the remainder slightly agreed that English language teaching should be about teaching grammatical knowledge so that students could be fluent in the language. The majority (75%) strongly agreed that students should be given opportunities for language production but any errors produced should be dealt with despite the message being understood. This suggested that language accuracy was the main ingredient in language production, and thus justified the need to focus on grammatical knowledge in English language teaching. This shows that the majority of the PELEs have strong ESL identities, emphasising the linguistics and grammatical aspects of the language. Only 8.3% strongly disagreed with correcting students’ errors when the message conveyed was understood, while 58% strongly agreed and 33.3% slightly agreed with this notion (item 12). In relation to student learning, the majority responded positively, with 41.7% responding strongly agreed, and another 41.7% slightly agreeded, when asked about EL educators having full control over what students learn (item 12), the remaining 16.7% slightly disagreed with this item. Thus, students’ language needs were determined generally based on what the PELEs perceived students should learn. A deeper understanding is required to determine how these perceptions impacted on English language teaching at this university.

The findings in this section indicated that the emphasis of English language teaching was on the language structure and grammatical knowledge, as well as language production. While the majority of the PELEs aimed for accuracy in language production and corrected any language errors, a small percentage of the PELEs believed that language errors need not be addressed when the message was conveyed. This suggests that the majority of the PELEs have strong ESL identities while a small number of them seem to have moved away from these identities. This finding is further examined and discussed in Chapters 6 and 7. In addition, English language teaching was based on their perceptions of what students should learn. These perceptions could impact on the design of the English language courses. The next section examines the PELEs’ perceptions of the design of the English language courses.

5.1.4 Developing English language courses

In the previous section, the findings raised concerns about the impact of the PELEs’ perceptions of developing English language courses. In this section, the PELEs’ perceptions of the English language courses are examined. Table 5-5 displays the PELEs’ perceptions of designing English language courses for the context of this university.
According to Table 5-5, the majority agreed (50% strongly agreed and 41.7% slightly agreed) that EL educators should design the English language courses based on what they thought was relevant to address student language needs in engineering contexts (item 14). 8.3% slightly disagreed with this item. For item 15, only 33.3% strongly agreed while 50% slightly agreed that the English language courses should be developed based on what students perceived their language needs were. About 16% slightly disagreed with this item. In terms of input from engineering faculties, 50% of the PELEs strongly agreed and 33.3% slightly agreed that English language courses should be designed and developed according to the language needs for engineering perceived by engineering educators.

These PELEs reported that they believed that EL educators, engineering lecturers and students should be involved in the design and the development of the English language courses. The findings raise the need to examine the course learning outcomes of the English language courses further and address concerns about how English language courses address language needs for engineering contexts. The next section presents the analysis of support and resources for EL educators teaching within the contexts of this university.

5.1.5 Support and resources for English language teaching in engineering

The previous section outlined the beliefs of the PELEs about engineering educators’ and students’ involvement in developing English language courses. In this section, the analysis of the PELEs’ perceptions of supports and resources for them to teach within the context of this university is presented and discussed. Table 5-6 shows the findings about the PELEs’ perceptions of supports and resources for teaching English for engineering.
Table 5-6: Perceptions of Support and Resources for Teaching English for Engineering

<table>
<thead>
<tr>
<th>Items</th>
<th>Always(4)</th>
<th>Frequently (3)</th>
<th>Sometimes (2)</th>
<th>Seldom (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. I determine the knowledge about English my students have before I teach them.</td>
<td>41.7%</td>
<td>33.3%</td>
<td>25%</td>
<td>0</td>
</tr>
<tr>
<td>18. The English Language Department provides me with guidelines on how I need to teach engineering students.</td>
<td>16.7%</td>
<td>16.7%</td>
<td>33.3%</td>
<td>33.3%</td>
</tr>
<tr>
<td>19. My colleagues from engineering faculties assist me in my teaching when I need assistance in teaching engineering students.</td>
<td>16.7%</td>
<td>0</td>
<td>16.7%</td>
<td>66.7%</td>
</tr>
<tr>
<td>20. The engineering faculties have provided the knowledge about English language needs in engineering.</td>
<td>8.3%</td>
<td>0</td>
<td>25%</td>
<td>66.7%</td>
</tr>
<tr>
<td>21. The engineering faculties provide me with learning outcomes that engineering students need to achieve.</td>
<td>8.3%</td>
<td>16.7%</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>22. I receive information about the criteria and process of accreditation for engineering programmes.</td>
<td>8.3%</td>
<td>0</td>
<td>41.7%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Table 5-6 reveals that all the PELEs identified the type of knowledge relating to English language that students had before they planned their teaching. The frequency of engaging in this practice, however, varied. The results showed that 41.7% responded that they always performed this practice, 33.3% responded frequently and 25% responded sometimes. This outcome showed that the PELEs believed it was important to know the students’ language background to frame their teaching at least some of the time. The result raises questions about how knowledge of students’ English language background helps EL educators to address English language and communication skills in English in engineering.

At the department level, a small number of PELEs (16.7%) reported that they always received guidelines from the English Language Department about how to teach English for engineering. Another 16.7% perceived that they frequently received these guidelines. A majority of the PELEs reported that they either sometimes (33.3%) or seldom (33.3%) received guidelines about teaching English for engineering students from their department. This finding showed that the PELEs perceived that the English Language Department provided some kind of support to EL educators in their teaching although this support was not consistent.

As shown in Table 5-6, the PELEs received limited support and resources in teaching English for engineering. About 16% of the PELEs indicated that they always received support from colleagues from engineering faculties while the majority (66.7%) indicated that they seldom
received support from engineering colleagues about teaching English for engineering. Only 8.3% reported that they always received knowledge about English language needs. The rest of the PELEs indicated that they either sometimes (25%) or seldom (66.7%) received knowledge about English language needs in engineering (item 20). In relation to the learning outcomes that engineering students need to achieve, 8.3% perceived that they always received this information from the engineering faculties, 16.7% indicated they frequently received this information while the others either sometimes (25%) or seldom (50%) received this information from engineering faculties (item 21). These findings raise questions about the inconsistencies related to items 20 and 21 about the dissemination of information. These questions are investigated and discussed further in Chapter 6.

With regard to the criteria and the process of engineering accreditation (item 22), only 8.3% reported that they always received such information while the others indicated that they had limited knowledge about engineering accreditation. This raises questions about how English language teaching is positioned by engineering education. This also raises challenges about how EL educators address graduate outcomes outlined in the engineering accreditation manual.

5.1.6 Practices in teaching problem solving skills

Teaching problem solving was perceived as an instructional strategy to develop students’ English language proficiency. Table 5-7 below shows the PELEs’ practices in teaching problem solving skills.
The analysis reveals that there was a sense of teaching problem solving skills demonstrated in the PELEs’ teaching practices although they indicated inconsistencies in teaching problem solving skills as a separate topic (item 28). The majority were positive about the goals of teaching problem solving skills from the perspective of English language teaching (items 26 and 27). However, they tended to concentrate on the process of problem solving more than on the English language when they teach problem solving skills. This can be seen in items 29 and 31 in Table 5-7. The majority indicated that the problem solving questions used for the problem solving process were not related to engineering. The questions of how EL educators teach the problem solving process and why the problem solving questions were not related to engineering require further investigation to obtain deeper insights on the challenges of English language teaching which included teaching problem solving skills at an engineering-based university.

According to Table 5-7, some of the PELEs either always (25%) or frequently (33.3%) taught problem solving when they aimed to improve students’ English language proficiency, while the others either sometimes (25%) or seldom (16.7%) used problem solving for this purpose. When teaching problem solving, more than half of the PELEs (58.3%) reported that they seldom taught problem solving as a separate topic and 33.3% indicated that they sometimes taught problem solving as a separate topic. Only 8.3% reported that they frequently taught problem solving as a separate topic. The practice of teaching problem solving among EL educators is examined further and discussed in Chapter 7.

<table>
<thead>
<tr>
<th>Items</th>
<th>Always (4)</th>
<th>Frequently (3)</th>
<th>Sometimes (2)</th>
<th>Seldom (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. I teach problem solving to help students develop their proficiency in English.</td>
<td>25%</td>
<td>33.3%</td>
<td>25%</td>
<td>16.7%</td>
</tr>
<tr>
<td>24. I teach problem solving as a separate topic in the English course.</td>
<td>0</td>
<td>8.3%</td>
<td>33.3%</td>
<td>58.3%</td>
</tr>
<tr>
<td>25. I concentrate on the English language when I teach problem solving skills.</td>
<td>16.7%</td>
<td>25%</td>
<td>50%</td>
<td>8.3%</td>
</tr>
<tr>
<td>26. I teach problem solving process or strategies to help the students find answers to the problem solving questions.</td>
<td>33.3%</td>
<td>33.3%</td>
<td>25%</td>
<td>8.3%</td>
</tr>
<tr>
<td>27. I encourage students to use their own strategies when finding answers to the problem solving questions.</td>
<td>50%</td>
<td>25%</td>
<td>25%</td>
<td>0</td>
</tr>
<tr>
<td>28. I teach problem solving to develop students’ problem solving skills which they can also apply to their engineering discipline.</td>
<td>25%</td>
<td>50%</td>
<td>16.7%</td>
<td>8.3%</td>
</tr>
<tr>
<td>29. I use problem solving questions which are not related to engineering.</td>
<td>41.7%</td>
<td>33.3%</td>
<td>25%</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 5-7: The PELEs’ Practices in Teaching Problem Solving Skills
Some of the PELEs reported that they either always (16.7%) or frequently (25%) focused on teaching English when they taught problem solving. The remaining number of PELEs indicated that they sometimes (50%) or seldom (8.3%) concentrated on teaching English when they taught problem solving. This highlights potential challenges in balancing teaching English and teaching problem solving skills. The ESL educators’ practices in teaching problem solving were examined further to provide insights on these challenges.

When teaching problem solving skills, the majority, responding either always, 33.3%, or frequently, 33.3%, indicated that they taught strategies for problem solving to the students. In addition, half of the PELEs (50%) reported that they encouraged students to use their own strategies when performing problem solving activities. A number of the PELEs (25%) perceived that they always taught problem solving to develop students’ problem solving skills relevant to the students’ disciplinary background and half of them (50%) frequently taught problem solving for the same reason. These perceptions appeared to contradict their perceptions about using problem solving tasks related to engineering. Based on Table 5-7, the PELEs either always (41.7%) or frequently (33.3%) used problem solving questions which were not related to engineering. This raises questions about how ESL educators teach problem solving skills related to engineering.

The findings in this chapter highlighted several questions and challenges which are examined further in Chapters 6 and 7. First, most of the PELEs were generally trained to teach English within school contexts. There were a small number who were not trained to become an ESL educator although they had expertise in English language. Nevertheless, the PELEs believed that they were equipped to teach English for a specific discipline in higher education institutions. This raises questions about how EL educators managed English language teaching for engineering and the challenges about English language teaching which involves teaching problem solving skills and teaching communication skills in English. Second, in teaching English at this university, the PELEs generally concentrated on teaching about language accuracy and correcting students’ language errors although language production among students was encouraged. In addition, PELEs reported that they had control over students’ language learning. This raises questions about how EL educators conceptualised English language teaching at this university, in terms of teaching English for engineering. Third, the findings showed that the engineering faculties should be involved in developing the English language courses so that these courses could address the requirements and expectations in engineering both academically and professionally. This raises questions about how the English language courses were developed and how these courses address the expectations of the engineering industries and academic disciplines. Fourth, the findings showed that the PELEs received limited resources and support in relation to teaching English that addresses English
language needs in engineering. The discussions about these limited resources and support led to questions about how English language teaching was positioned. Fifth, when teaching problem solving skills, there were challenges in balancing between teaching problem solving and teaching English.

The findings in this chapter not only profiled the PELEs and raised questions and challenges that required further investigation, but also provided the basis for selecting the participants for the main study. The final section of this chapter presents the selection of the participants for further investigation.

5.2 Selecting Participants for Further Investigation

The analysis of the questionnaire provided the background of the PELEs and an overview of their perceptions of engineering accreditation and English language teaching within the context of this university. Four participants among the 12 PELEs were recruited based on the procedure outlined in Chapter 3. The main criteria for recruiting these participants were that they were currently involved in teaching and learning (those who were on study leave were excluded), and that the students they taught were engineering students. These participants also met the criteria related to teaching qualification (educators with and without teacher training), as well as teaching experiences (number of educational settings they worked in) and years of teaching, which addressed the concerns about understanding the engineering accreditation requirements raised in the document study, and the demands of the research questions in relation to the implications of engineering accreditation requirements on English language teaching, and ways in which the EL educators managed the complexities of English language teaching in engineering.

The first participant selected was Jamal who had extensive teaching experience and 13 years teaching at secondary school. Mila was selected because although her qualifications indicated that she had not undertaken teacher education, she believed that her undergraduate education provided her with a strong foundation to teach English. Mila could provide insights into her early career experiences of teaching English in higher education institutions as she had only taught for two years and this university was the only educational setting that she had taught in. Justin was selected as he was the only EL educator from all 12 PELEs who had completed his education in TESL overseas. The final participant for this study was Mat. Apart from his years of teaching experience with a background of teaching in two educational settings, Mat’s keen interest in teaching problem solving triggered the need to investigate how he taught problem solving skills through English language teaching, and the extent to which he saw English language teaching as a challenge.
5.3 Conclusion

This chapter presented the analysis of the PELEs’ perceptions of their teaching background, beliefs and teaching practices related to English language teaching in engineering. The findings showed that their teacher training and beliefs indicated that they were prepared to teach within school contexts. In addition, they demonstrated limited connection to the requirements in engineering based on the way they conceptualised English language teaching and the resources that were available for them to teach within the context of this university. These findings raise questions about how these PELEs transform their undergraduate education that has prepared them for teaching in a school context, into an adult learning environment, and how they manage English language teaching in higher education in an engineering context, particularly in teaching problem solving and communication skills when they have strong ESL identities, emphasising the linguistics and grammatical aspects of the language. Four EL educators with diverse experiences and expertise were selected for further investigation. Their experience and their conceptualisation of English language teaching within the context of engineering are investigated further and discussed in the next chapter.
Chapter 6  Isolating English Language Teaching

The analysis of the quantitative data in Chapter 5 profiled the participating EL educators (PELE) revealing that three of the PELEs were not trained to teach English while those PELEs who had a teacher education background were equipped to teach English for general purposes in a school setting. Nine of the PELEs who had teaching experiences had taught in school prior to teaching at this university. These nine PELEs considered that language production was about producing grammatically correct sentences and accurate language. This finding suggests that the PELEs had strong ESL identities, raising questions addressed in this chapter about how they conceptualised and managed teaching ESP.

In developing the English language courses, 83.3% of the PELEs acknowledged the need for the three engineering faculties to be involved in course development so that students’ language needs in engineering could be addressed. However, 66.7% of the PELEs reported that they had limited support from engineering faculties, raising questions about how English language teaching and English language courses addressed the need for ESP, particularly in the context of the engineering discipline. At least half of the PELEs had limited understandings of engineering accreditation requirements and this chapter explores the impact of this on their perceptions of the need to teach English for engineering.

The findings in Chapter 5 raised questions about how English Language (EL) educators positioned English language teaching and English language courses in engineering education, and how EL educators shifted from teaching in a school context to the university environment. The analysis identified potential challenges for these EL educators in positioning themselves within this environment and moving towards teaching ESP. These questions and challenges are discussed in this chapter. The chapter focuses on four participants who are profiled in Table 6-1 below.
Table 6-1: The Profile of Selected Participants

<table>
<thead>
<tr>
<th>Participants</th>
<th>Qualifications</th>
<th>Teaching Experience</th>
<th>Years of teaching in school</th>
<th>Years of teaching at this university</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamal</td>
<td>TESL (Teaching English as a Second Language) from a local university</td>
<td>17 years</td>
<td>13 at a secondary (boarding) school</td>
<td>4 years</td>
</tr>
<tr>
<td>Mila</td>
<td>English Studies from a local university (no teacher training)</td>
<td>2 years</td>
<td>None</td>
<td>2 years</td>
</tr>
<tr>
<td>Justin</td>
<td>TESL (Teaching English as a Second Language) from an overseas university</td>
<td>14 months</td>
<td>4 months at a primary school</td>
<td>10 months</td>
</tr>
<tr>
<td>Mat</td>
<td>TESL (Teaching English as a Second Language) from a local university (Interest in teaching problem solving)</td>
<td>9 years</td>
<td>2 years in a secondary school</td>
<td>7 years</td>
</tr>
</tbody>
</table>

The participants present with a broad range of experiences. Jamal, Justin and Mat were qualified TESL teachers, with Jamal and Mat trained locally while Justin trained overseas. Mila, on the other hand, was not trained to become a teacher or a university educator. Jamal had been in a secondary (boarding) school for a long time, teaching students with exceptional English language proficiency level. Mat had been in a secondary school and this university for almost the same length of time. Justin had only been teaching in a primary school and this university for a short time. Mila had been with the university for two years and her teaching experience developed in this context as she had not taught in a school prior to this academic appointment.

This chapter presents the analysis of the interview data collected with four participants with the purpose of drawing out participants’ knowledge and understandings of the requirements for ESP as mandated by the engineering accreditation and how they positioned English language teaching within the engineering academic curriculum. Overall, the analysis shows that the participants had limited knowledge and understandings of the engineering accreditation requirements. This impacted on how these EL educators positioned English language teaching, developed English language courses, and established their professional identities in a discipline-specific educational setting. The next section presents the analysis of the participants’ knowledge of engineering accreditation requirements.
6.1 EL Educators’ Knowledge about Engineering Accreditation Requirements

The analysis of the interview data generated findings about the participants’ knowledge about engineering accreditation requirements. The results revealed that they had limited knowledge.

*Accreditation of engineering? I don’t think I know about that.* (JustinT3L606)

*[Accreditation] for engineering programmes? Not really [I don’t really know about it].* (MilaT4L283)

Given that Justin and Mila had not taught at this university for long (Justin had taught for 10 months while Mila had taught for approximately 2 years), their limited knowledge could be due to them being new to the engineering environment. However, the analysis of Mat and Jamal’s interview data (both had taught at the university for more than five years) showed that they also knew little about the accreditation of engineering programmes.

*I know that there’s a board coming to this university and they went through the documents. That’s all.* (JamalT6L412)

*It [the engineering programme] has to achieve a certain standard or level in order to be accepted as high standard kind of thing. But I had no idea about the requirements or the criteria.* (MatT1L432-436)

Therefore, the number of years of teaching at this university did not necessarily ensure that EL educators knew about engineering accreditation. This raises a question about whether the engineering accreditation requirements, particularly graduate outcomes, were made available to EL educators. When asked if the English Language Department or any EL educators had been involved in the engineering accreditation process, Justin reported that, “It has not been done yet” [JustinT3L610].

All the excerpts above suggest that the requirements of engineering accreditation may not have been considered when EL educators conceptualised English language teaching at this university. Thus, these EL educators may not make the connection between their roles in English language teaching and their roles as ESP educators. The process of dissemination reported in Chapter 4 indicated that all engineering programmes went through an accreditation process by the Ministry of Higher Education through the Malaysian Qualifications Agency (MQA) and by the Board of Engineers (BEM) through the Engineering Accreditation Council (EAC). Jamal reported that he recognised the MQA as the only agency which certified the engineering programmes and awarded accreditation to this university.
Accreditation as far as I understand is the recognition given by the authority to a programme at a university that fulfil certain requirements like the MQA [Malaysian Qualifications Agency] and COPIA [Code of Conduct for Institutional Audit by MQA]. I’ve never heard of any accreditation from engineering bodies. I think those who are directly involved are well-informed. (JamalT6L425-434)

His knowledge was limited to knowledge about the process of quality assurance by the Malaysian Qualifications Agency. In addition, he believed that the relevant information was limited to those who were directly involved in the engineering accreditation process. This implied that from his perspective, the requirements of engineering accreditation, particularly the graduate outcomes, were not made available to all EL educators despite the requirement to address these outcomes. Thus, the requirement for ESP, particularly for engineering may not be recognised by all EL educators.

In Chapter 4, the findings indicated that the engineering accreditation requirements, particularly the graduate outcomes, went through a filtering process involving adaptation into university objectives at university level, and selection and adaptation into course learning outcomes for English language courses at English Language Department level. The findings in this section reveal the outcomes about this process whereby the requirements were filtered further by being disseminated only to EL educators who were involved in the engineering accreditation process. This filtering process positioned English language teaching as isolated from engineering education and EL educators as educators who only needed to have knowledge about language aspects that they were expected to address. The limited access to the engineering accreditation requirements potentially affected how these EL educators positioned English language teaching and understood their role in addressing the engineering industry demands.

The EL educators’ limited knowledge about the engineering accreditation requirements as reported in this section could create ambiguities in understanding and in interpreting English language teaching at this university (see Mohammad, Kassim, & Yusof, 2012; Affandi, Hassan, Ismail, & Kamal, 2012), raising challenges in addressing the demand for ESP in their teaching (Baldauf, Kaplan, Kangwangamalu, & Bryant, 2011; Kaplan & Baldauf, 2011). While Ali (2013b) reported that the limited understanding of requirements was due to the mode of dissemination (verbal or written), the present study highlighted that the process of dissemination itself also contributed to this limitation. In this study, the process involved two forms of filtering which included a) the process of selecting the graduate outcomes relevant for English language teaching at English Language Department level, and b) the dissemination of the information only to selected ESL educators (who were directly involved in the engineering accreditation process). As a result of
this filtering, English language teaching may potentially be positioned as separate from engineering academic curriculum by the participants.

6.2 Positioning English Language Teaching in an Engineering Academic Curriculum

In Chapter 4 (Section 4.2), the analysis of the graduate outcomes of the Engineering Accreditation Manual (EAM), the programme educational outcomes and the programme learning outcomes (engineering faculties) revealed that English language teaching was positioned as ESP, with a focus on developing communication skills in English in engineering and in problem solving skills. However, this positioning was not evident in the learning outcomes at the level of the English language courses. The previous section highlighted that the requirements of engineering accreditation were filtered and the demand for ESP in engineering by the engineering accreditation was not recognised at the English Language Department level. As a result, the course learning outcomes and the English language courses did not reflect ESP.

The analysis of the participants’ beliefs and reported teaching practices reported in the interview data revealed that the participants’ positioning of English language teaching was influenced by their beliefs about English language teaching. These beliefs and how they impacted on EL educators’ positioning of English language teaching and development of English language courses for the context of this university are analysed in the next section.

6.2.1 English language teaching in isolation

The participants’ beliefs about English language teaching impacted the way that they positioned English language teaching at this university. Mat, for example, reported that during his undergraduate teacher education, “we were exposed to theories like behaviourism and constructivism which I hold dearly” [MatIntT1L21-23]. These theories had shaped his beliefs about teaching English that “when it comes to language, I believe it should be ... student-centred” [MatIntT1L46]. Mat believed that students needed to participate in their learning in order to learn. He did not prefer teaching through delivery of knowledge as it “is traditional and is rote learning. Teachers teach students learn. Students do not question what teachers give them. They just receive and follow” [MatIntT1L156-158]. In Mat’s account, he positioned English language teaching as a space for transforming learners from passive to active learners.

Mila’s belief was consistent with Mat’s that university students should be responsible for, and be active in their learning, and she was not in favour of transmission models of delivering content.
It’s not just me feeding them, giving them [information]. I don’t want that. Otherwise, it will be just the same as in school. (MilaIntT5L101-102)

Mila conceptualised English language teaching as one-way interactions where students listened and received information, encouraging passive learning. She resisted positioning English language teaching in such a way at this university, believing it to be inappropriate for an adult learning environment. Her resistance contributed to a sense of agency which enabled her to conceptualise English language teaching in higher education as a space for students to be active learners.

Justin, however, positioned English language teaching in this university the same way as in a school setting, believing that his pedagogical knowledge was appropriate for both contexts.

What I can say [about teaching at a higher education institution is that] only the approaches are different but the knowledge [about English language teaching] is the same. I learnt about the win-win situation and about how to reward students. These can be applied at school and at university levels. (JustinIntT3L130-135)

This indicated that his approaches to teaching and managing students were carried over to the university context. Nonetheless, he acknowledged the need for different approaches for different educational settings.

Jamal reported that he had completed teacher education specialising in teaching English as a second language (TESL).

Our degree was specifically in TESL [Teaching English as a Second Language]. I think it is zooming towards becoming an English teacher...you focus on teaching language. (JamalIntT6L41-44)

In this account, Jamal exhibited a strong identity as an ESL educator, reviewing that teaching required him “to make sure that everything is delivered to them” (JamalIntT6L66-67). Thus, he positioned English language teaching as teaching about the language from a transmission perspective.

Both Justin and Jamal had taught in a school context. Their years of teaching differed: Justin with only 10 months of teaching experience while Jamal had taught for 13 years. However, the findings showed that both Justin and Jamal brought their beliefs about English language teaching from their previous school settings into their current adult learning environment. This finding raised potential challenges in transforming their pedagogies to meet the needs of adult learners and developing their professional identities in the context of higher education.
Mat had also taught in a school setting but he positioned English language teaching in higher education differently from a school setting. He recognised that he needed to transform his pedagogy from transmission (in school) to emerging active learning (higher education). Mila shared Mat’s belief that English language teaching in higher education should not be positioned the same way as in a school. These findings align with studies which highlight the significance of understanding institutional contexts in positioning English language teaching and developing educators’ beliefs and pedagogical choices (Sanchez & Borg, 2014; Young & Sachdev, 2011). In the current study, the findings contribute to the literature by highlighting the potential challenges for EL educators to shift their positioning of English language teaching, and in translating pedagogies meant for school settings to higher education settings.

This study found that transitions occurred when educators recognised that the demands within an educational setting differed from their previous educational setting. Mat, for example, illustrated transition of beliefs from a school context to a higher education institutional context. In Mila’s case, although she had no previous teaching experience, she had preconceptions of what English language teaching was in a school setting. Her transition was based on her preconceived beliefs about English language teaching in a school setting and what she believed English language teaching in higher education should be. She resisted positioning English language teaching in higher education the same way as in a school setting.

The findings about how Justin and Jamal maintained their beliefs and how Mat transformed his beliefs when shifting from a school setting to a technical university extends the work of Scotland (2014) which indicated that experienced educators either negotiated or maintained their beliefs when changing into a new workplace. While the teachers in Scotland’s study maintained their beliefs because their perceptions of their new institutional context corresponded with their existing beliefs, Justin and Jamal maintained their beliefs in their new institutional context because they conceptualised adult learning environments the same way as they conceptualised school learning environments. This is explored further in Chapter 7 (Section 7.1).

The findings in this section highlighted two ways of positioning English language teaching within the context of this technical university. First, English language teaching provided a space to transform the language learning environment from passive to active. This transformation focused on encouraging students to become responsible for their language learning. Second, English language teaching was positioned the same way as in a school. One educator (Mat), however, managed to adjust his pedagogies to suit an adult learning environment. In this context, teaching was framed to concentrate on teaching English as a second language for general purposes. The implications of
these differences are that EL educators who maintain pedagogical beliefs about the transmission approach, more commonly used in school settings, may find teaching soft skills such as problem solving skills more challenging as the pedagogies required focus on active learning. Studies on teacher beliefs have shown that teacher beliefs and classroom practices are connected (e.g. Farrell & Tomenson-Filion, 2014; Li & Walsh, 2011; Sanchez & Borg, 2014). In this section, the findings showed that the beliefs of the participants impacted on how they positioned English language teaching at this technical university, and consequently on how they approached their teaching.

The findings in this section indicated that there were disconnections between how these EL educators conceptualised and positioned English language teaching, and understood engineering requirements. These disconnections impacted on the development of the English language courses and are analysed in the next section.

6.2.2 Disconnections between English language courses and the curriculum

The analysis of the syllabus of the English language courses documents in Chapter 4 (Section 4.4) revealed that not all university objectives were required to be addressed in a course. Table 6.2 below shows the programme outcomes and the university objectives which were addressed through the learning outcomes of English language courses.
Table 6-2: *The Programme Outcomes and the Selected University Objectives for Developing Learning Outcomes of the English Language Courses*

<table>
<thead>
<tr>
<th>Engineering Accreditation Programme Outcomes</th>
<th>University Objectives</th>
<th>Learning Outcomes of the English Language Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to communicate effectively, not only with engineers but also the community at large</td>
<td>An ability to communicate effectively/ use ICT effectively</td>
<td>• To develop English language competence for oral and written (communication) in a wide range of contexts (Communication Course).</td>
</tr>
<tr>
<td>Ability to undertake problem identification, formulation and solution</td>
<td>An ability to identify problems, create solutions, innovate and improve current practices</td>
<td>• To develop English language communicative competence for academic purposes (English for Academic).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• To develop English language writing competence for specific purposes (Technical Writing).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• To train students in working collaboratively with people of various cultures and professional backgrounds.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• To develop lifelong learning skills for continuous personal and professional development.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(For all the three courses: Academic English, Communication, and Technical Writing)</td>
</tr>
</tbody>
</table>

Table 6-2 highlights several issues. First, the need for English for engineering as stated in the programme outcome for engineering accreditation was diluted through the university objectives. For example, the outcome *ability to communicate effectively, not only with engineers but also the community at large* has been transformed into *to develop English language competence for oral and written (communication) in a wide range of contexts* and the specific context of engineering had been excluded. Thus, the English Language Department developed learning outcomes for general contexts which were expected to be applicable in various contexts. Second, the selection of the two university outcomes to develop the learning outcomes for the English language courses was based on the interpretation of the EL educators who specialised in pedagogies related to ESL and English for general purposes. Third, the need for problem solving skills among engineering students was interpreted by the participants as the skills for working collaboratively with various people and lifelong learning. Based on these three issues, the requirements for English language courses to address the language needs in engineering were not explicitly translated into the learning outcomes of English language courses and the identity of ESP specifically for engineering was compromised.

The fact that these requirements had not been made available to the English language department meant that the learning outcomes of the English language courses were not contextualised into engineering (see Chapter 4 for detailed discussions). This affected the design and the content of the English language courses.
In developing the syllabus and the content for the English language courses, the analysis of the interview data showed that the English Language Department referred to the university outcomes to develop or review the learning outcomes. Some of the participants understood this connection and therefore English language courses held a role in fulfilling university outcomes and thus also implicitly fulfil the requirements for accreditation.

*We actually have to follow educational outcomes from the university. Then we have to follow the soft skills.* (MilaIntT4L296-298)

*We have the university learning outcomes, 10 of them. From that we have the subject learning outcomes. So we need to fulfil certain outcomes.* (MatIntT1L446-448)

Both Mila and Mat recognised that the English language courses were required to address university outcomes and soft skills. Mat also indicated that only certain university outcomes were used to develop the learning outcomes of the English language courses.

In Chapter 4 (Section 4.4), the analysis of the engineering curriculum at this university indicated that the English language courses were generally located within the first three semesters of an engineering programme. Mat argued that teaching English language courses at this time was irrelevant to the students because they were not able to relate the knowledge and skills that they learnt from these courses into their engineering programmes.

*The English language courses should be taught during third or fourth year so that it will be relevant to their studies. How relevant [will it be]? They will produce something that is related to their field of study [when they do their final year project].* (MatIntT1L274-277)

Mat argued that it would be more useful if these English language courses were taught to third or fourth year students because these courses taught them about communication skills which they could apply in their discipline academically and professionally.

*...it is about negotiation skills, discussions and meetings, free lance interviews and job interviews. Now, these topics should be more relevant to students who are about to leave the university.* (MatIntT1L268-272)

Engineering students who were in their first three semesters were taught the components of general education such as language, mathematics and science with limited content about engineering. The impact of this was that Mat did not see the relevance of introducing content related to specific engineering disciplines.
Their faculties, they do not teach engineering subjects per se [over these three semesters]. So, students learn about language, a little bit about maths, science but not engineering. If I were to put in something, for example issues related to mechanical engineering, they will not be able to see the relevance. They will not understand it [how to perform the tasks for English language courses]. (MatIntT1L235-241)

The key issue emerging from Mat’s argument is that the locations of the English language courses in the engineering curriculum limited the space to contextualise English language courses into engineering disciplines, both academically and professionally. Studies related to curriculum development have highlighted that English language courses need to be situated in locations which can support the integration of English and engineering content within the engineering academic curriculum (Beck, 2004; Dannels, Anson, Bullard, & Peretti, 2003; Lappalainen, 2010). However, the location of the English language courses within the engineering academic curriculum at this university limited opportunities for integration. In addition, when developing English language courses intended to address the language needs in engineering, the requirements for integration of English language and engineering courses needed to be explicitly articulated and the English language skills for engineering needed to be identified (Venkatraman & Krishnamurthy, 2008; Venkatraman & Prema, 2007). However, these explicit requirements were not incorporated into the learning outcomes of the English language courses and thus, the English language skills for engineering were not identified (see Table 6-1 and Chapter 4 for detailed discussions). Mila saw this omission as being caused by a lack of input and consultation by engineering faculties:

*Usually, there is no input from the engineering faculties about what they want the students to learn [in English language courses]. It all depends on the English Language Panel.* (MilaIntT5L316)

Jamal and Justin agreed with Mila:

*We [English language department and engineering faculties] never discussed how to cater for the needs of their students.* (JamalIntT6L271)

*We don’t have guidance. Maybe this faculty wants this or that faculty wants that.* (JustinIntT3L618-620)

The lack of input and discussion impacted on the design of the English language courses whereby the syllabus was based solely on the understandings of the EL educators.

*We put in what we feel applicable and appropriate for the syllabus [to achieve the main goal]*. (JustinIntT3L621-622)

Mat was the only EL educator who reported that the design of the English language courses was based on the requirements by the engineering faculties.
The respective faculties think that their students need to learn about how to function effectively, in business meetings and job interviews. Basically, that is how we came up with the syllabus then. It goes back to the nature of these subjects being service subjects meaning that whatever the faculty wants, we give them. This is the English that they want so we give [it to] them. (MatIntT1L295-303)

His account suggested that the design or the content of the English language courses was controlled by the engineering faculties. For the other participants, these requirements were not shared by engineering faculties with the English Language Department, or the EL educators themselves.

This finding supports and extends Ali (2013b) who found that the absence of explicit articulation of the English as Medium of Instruction (EMI) in one engineering university in Malaysia resulted in ambiguity in interpreting the goals of the EMI policy and these goals were not achieved as envisioned by the policy designers. The findings in her study showed that due to this ambiguity, English was only used to deliver knowledge whereas teacher-student and student-student interactions were in their first language, Bahasa Malaysia. While Ali’s findings indicated that the absence of explicit articulation of the policy impacted on implementing EMI among content (engineering) educators, the findings in this study highlighted that the absence of explicit articulation of the requirements for English for engineering impacted on the design and the development of the English language courses.

In developing the learning outcomes of the English language courses, these EL educators selected and interpreted the university outcomes based on what they perceived to be relevant with regard to English language learning, indicating that the engineering accreditation requirements were marginalised by EL educators. These outcomes were selected based on their positioning of English language teaching as enhancing proficiency in English and communication skills for specific purposes in general contexts. Even Mat reported that English language courses were service courses and therefore the content included was that demanded by the engineering faculties. The content focused on job interviews and meetings which were applicable for various contexts, but not specified for engineering disciplines.

The dissemination process of the requirements of engineering accreditation diffused the demand for ESP for engineering as a result of several layers of amendments and changes, isolating English language teaching from the engineering academic curriculum. As a result of this positioning, English language courses developed were not contextualised into engineering. The choices that the EL educators made in developing the English language courses were influenced by their understanding of the context in which they worked. In addition, the choices that they made
may also be influenced by their agency to address the demand for ESP. These choices and issues of agency are discussed further in the next chapter.

The positioning of English language teaching within the engineering academic curriculum may also cause challenges for EL educators to position themselves as ESP educators. The next section discusses how the participants positioned themselves within the context of this university.

6.3 Positioning EL Educators beyond their Expertise

This section focuses on the professional identities that the participants developed within an engineering context. In analysing the interview data, the participants’ beliefs, perceptions and pedagogy associated with their professional identities were established. The analysis generated findings which indicated that the location and time allocated for English language courses, EL educators’ understandings about teaching English for engineering and teaching problem solving skills, the lack of priority given to the English language courses and students’ limited proficiency in English created challenges for the EL educators to position themselves as ESP educators teaching English for engineering and teaching problem solving skills.

The analysis of the interview responses revealed that the participants recognised the need to contextualise the content of the English language courses and their teaching to engineering.

*I'm an engineering person myself because I love cars. I can explain about engines from top to bottom. I know about some of the courses in mechanical and electrical [engineering]. I really use that knowledge in my teaching. I ask them about thermodynamics, about liquid, about pistons, [things] like that.* (JustinIntT3L276-283)

The element that provided Justin the opportunity to create this space was his knowledge of engineering which he gained during his schooling as well as from his interest in cars. In his case, relevant knowledge played an important role in his teaching as he could position himself as a provider of content through language learning.

*I think we do need that [contextualising English language courses for engineering]. Our syllabus is general. I think that the English that we teach is general English. We need to be a bit more specific. We need to cater for different engineering faculties.* (JamalIntT6L255-260)

Jamal, for example, advocated above that the syllabus was general and did not specifically cater for engineering fields. He recommended that English language courses which were more specific for various engineering fields should be developed.
There are many times where we actually have to use examples from engineering fields; all these technical terms. (MilaIntT5L164-165)

All the accounts above suggested that the need for ESP, particularly for engineering, was aspirational. However, some of the participants could not see themselves as ESP educators. Jamal, for example, was reluctant to include engineering content or issues in his teaching and classroom activities.

*I may not understand what they want to do. If they did something technical I don’t know if they [are] lie [lying to me by making up something technical].* (JamalIntT6L246-247)

In this instance, there was a sense of resistance to including knowledge that was not within his area of expertise because he did not have an engineering background like Justin had. Jamal wanted to maintain his sense of being in control of the teaching and learning and felt that this was not possible if he integrated engineering content and English language teaching. In addition, Jamal also reported that his students were not keen themselves to draw on engineering knowledge or issues in their tasks.

*I don’t emphasise [to] them [students] to carry out tasks that [are] engineering related. None of my students chose to do that.* (JamalIntT6L237-239)

The students’ resistance to using engineering content or issues in English language courses may have resulted from the locations of the English language courses in the academic curriculum where engineering fundamentals had not been learnt by engineering students (see Chapter 4 Section 4.3.2 for discussion). Students’ resistance to using English when learning engineering content could also be linked to limited proficiency in English.

Mila indicated that engineering issues were only addressed when it was necessary.

*Most of the time, I don’t use engineering issues.* (MilaIntT5L164-166)

Her focus on technical terms suggested that her use of engineering knowledge or issues was only circumstantial. She indicated that she required control over basic engineering knowledge before she could incorporate this knowledge in her teaching.

*In terms of basic knowledge [of engineering] I think I need to familiarise myself with the terms first.* (MilaIntT5L169-170)

The above account suggests that Mila needed to learn more to enable her to move towards becoming an ESP educator.
It will be very useful if there’s a short course, [to] at least expose English language educators to basic engineering. (MilaIntT5L176-179)

Mila referred to her situation of not being able to become an ESP educator and made positive suggestions that short courses be provided to assist EL educators.

Both Jamal and Mila recognised the need for ESP. However, they were not ready to shift from ESL to ESP teaching as they were not equipped to teach English for engineering. Thus, they maintained their identities as ESL educators teaching English for general contexts.

From his perspective, Mat argued that incorporating engineering knowledge into the tasks for English language courses could hinder students from effectively performing tasks required by these courses. In order to ensure that students could perform tasks for the English language courses, Mat incorporated content which could be related to engineering but which was generic in nature.

When I bring in some technical information, it will be about generic things like mobile phones, cameras, generic things that everyone might have. That one they can relate [to]. Yes. (MatIntT1L243-245)

In this instance, Mat demonstrated that he had shifted from an ESL to ESP educator. However, his perception of ESP was that of being for general purposes.

Based on the findings above, having engineering knowledge was the key to exercising agency to integrate engineering content and English language courses. There have been studies which have reported that teacher knowledge and teacher agency are connected (Hökkä, Eteläpelto, & Rasku-Puttonen, 2012; Sannino, 2010; Sawyer, 2002). In the case of this study, when the participants had some expertise in engineering, they were able to see themselves as ESP educators and reported practices which integrated English language and engineering. However, when they were not equipped with such expertise, they made the choice to maintain their existing identities (as ESL educators), although they recognised the need to move towards becoming ESP educators.

The discussion in this section highlighted the role of discipline knowledge in exercising agency to provide a space to integrate engineering content and English language, moving from an ESL to ESP educator. First, the location of the English language courses within the academic curriculum did not support the integration of discipline knowledge and general English. The English language courses were taught when engineering fundamentals had not yet been taught to the engineering students. One of the participants (Mat) indicated that there was no point integrating engineering content and English because he perceived that students were not able to link what they learnt in English language classrooms to their engineering discipline.
Second, when engineering knowledge was part of their expertise, the participants (for example, Justin) exercised their agency to provide the space for this integration. When engineering knowledge was unfamiliar (for example, Jamal), they avoided integrating engineering content and English language courses.

Third, the English language courses were not developed for engineering (not ESP-type courses) (as discussed in Chapter 4). Therefore, EL educators had limited guidelines about how to teach English for Engineering. In her study about the implementation of English as a Medium of Instruction (EMI) policy at one technical university in Malaysia, Ali (2013b) found that a small number of her participants implemented this policy although the goals were not explicitly documented and disseminated to engineering lecturers at that university. Her findings showed that a policy is addressed when educators have the agency to do so. In the case of this study, the findings add to the literature by identifying three conditions in which agency can be exercised: first, when the participants have knowledge about the subject matter, second, when the design of the curriculum supports the integration and, third, when the English language courses are designed to support this integration.

This section highlighted that limited knowledge about engineering, location of English language courses and the nature of the English language courses created challenges for EL educators to move beyond their ESL expertise and become ESP educators. In addition, limited knowledge about teaching problem solving skills may also be challenging for ESL educators. The next section further discusses participants’ perceptions of the demand for teaching problem solving skills and the role of agency in addressing this demand.

6.3.1 Recognising the demand for teaching problem solving skills

When analysing the interview data for reported practices in teaching problem solving skills, it was found that problem solving skills were taught implicitly in English language teaching at this university. Similar to the need to incorporate engineering content or issues into English language teaching, teaching problem solving skills was not specifically indicated either in the learning outcomes or the course syllabus of all English language courses.

When I first started teaching here, I [had] no idea what soft skills meant or how many skills there are. [Only] after I went for [professional development courses]... I [got] to know [about soft skills], but just on the surface. (MilaIntT5L221-229)

Mila indicated efforts to move beyond her ESL expertise to becoming an ESP educator to address the demand for teaching soft skills. The workshops that she attended provided her with some
knowledge, triggering her move towards teaching soft skills in English language teaching. This suggests that the transmission of the demand to teach soft skills was limited only to those who attended these types of workshops. This finding provides further elaboration about the filtering process discussed in Chapter 4 in that opportunities for EL educators to access information about the engineering accreditation requirements and expectations of the university were limited to those attending the related workshops. This raises potential challenges as the filtering process deprived the ESL educators of opportunities to “interpret the ambiguities and gaps in critical ways” in the engineering accreditation requirements and programme outcomes (Ramanathan & Morgan, 2007, p. 448).

As a result of differences in their interpretation of soft skills, particularly in problem solving skills, the participants reported various understandings of problem solving skills. For Mila, teaching problem solving skills was generally about finding solutions to problems.

*Bascially students were given problems or issues and they actually have to find solutions.* (MilaIntT5L232-233)

She believed that students should determine their own process to find the solutions to a given problem. Justin shared a similar understanding:

*Problem solving skills [as] I understand [them involves us] giv[ing] them a task which includes a problem and then they do self-learning.* (JustinIntT3L437-439)

While Mila’s understanding was about the process of finding solutions, Justin’s understanding was about students’ self-learning. Justin argued that teaching problem solving skills was complex because it involved teaching various skills.

*I really want to teach them problem solving. There are so many skills in problem solving.* (JustinIntT3L600-602)

Jamal shared similar views:

*Teaching problem solving skills is not easy. The lecturer has to be knowledgeable. As lecturers, we need to be prepared.* (JamalIntT6L360-361)

He believed that EL educators needed specific knowledge about problem solving skills and the knowledge about how to teach problem solving skills before they could teach in their classrooms. Jamal understood that he had the power to decide on teaching problem solving skills for engineering contexts and incorporate engineering content into his classrooms. However, his idea of problem solving was about expressing opinions and ideas, and his main concern was that students used English to interact with each other:
It can be a cross-curricular activity. Although I’m teaching English, I can give them problems pertaining [to] language plus their field. They can apply what they have learnt from other core subjects in my English class. They can express their opinion and discuss with their friends using the language (JamalIntT6L333-338).

His view did not align with specific requirements for soft skills in engineering. Rather, the problem solving skills that he understood were generic, appropriate for general purposes.

Mat showed that he had a deeper understanding of the concept of problem solving compared to other participants.

There are two types of problems, real life problems and make believe problems. A problem is not necessarily something that has gone wrong. It can be an opportunity, something that we can improve or innovate. I’ll always ask my students to find novel ways to solve a problem. If it’s usual, it’s not worth thinking about. (MatIntT1L333-338)

His understanding of problem solving skills was about inventions and innovations, suggesting that he had the potential to provide opportunities for teaching problem solving skills related to engineering. His view about problem solving skills aligns more closely with that defined in engineering. This raises the importance of understanding and obtaining skills related to teaching problem solving skills before EL educators can include this in their teaching.

The challenges of integrating soft skills into teaching and learning in higher education institutions in Malaysia were evident in several studies (Devadason, Subramaniam, & Daniel, 2010; Affandi et al., 2012; Musa, Mufti, Latiff, & Amin, 2011; Zaharim, Ahmad, Yusoff, Omar, & Basri, 2012). However, questions were raised about the outcomes of developing soft skills in higher education. Nikitina and Furuoka (2012), for example, discussed the ambiguities of framing and conceptualising soft skills. Shakir (2009) raised the issue of the limited guidelines for assessing soft skills at the tertiary level which impacted the teaching and learning process. Chell and Athayde (2011) argue that understanding soft skills is complex because it involves understanding a set of knowledge and beliefs. Given a different context, soft skills may be defined and understood differently.

The findings in this study contribute to this body of knowledge, especially on ambiguities in conceptualising soft skills (Nikitina & Furuoka, 2012) and the complexity of understanding soft skills (Chell & Athayde, 2011), by identifying the ambiguities in conceptualising problem solving skills. First, teaching problem solving skills was about creating or innovating ideas to solve problems. This understanding about problem solving skills aligns with the requirements stated in the Engineering Accreditation Manual (EAM) that engineering graduates must have the ability to
undertake problem identification, formulation and solution. Second, teaching problem solving skills was about students experiencing discovery learning and not about the solution for a problem. Third, teaching problem solving skills was about using the language throughout the process of problem solving. The problem solving process was viewed as the medium for interactions or communications. The second and third understandings about problem solving skills were general in nature in that they did not align with the type of problem solving skills defined in engineering.

Among the conceptualisations of problem solving skills discussed above, only the first conceptualisation, developed by Mat, was relevant for the engineering field. The understandings about problem solving skills of the remaining three participants were geared towards generic problem solving skills and concentrated on the use of English language. This means that the participants had not understood the type of problem solving skills required in engineering. These different understandings and beliefs about teaching problem solving skills influenced the participants’ practices and goals in teaching problem solving skills. The next section presents the analysis of the reported practices in teaching problem solving skills among the participants.

6.3.2 Managing students’ language needs and motivation

In the previous section, the analysis highlighted challenges that the participants faced in positioning themselves as ESP educators and in teaching problem solving skills for engineering contexts. In this section, managing students’ language needs and motivation towards the language, and addressing the university objectives, created another set of challenges for the participants to address in positioning themselves as ESP educators within this university. For example, Justin identified himself as an ESL teacher who taught grammar and who gave exercises or homework on grammar to students. He positioned himself this way because he perceived that his students expected him to hold that identity.

I really need to do repetition [of the grammar rules that I teach them]. I will give them homework. [In] the next class I want to see that homework. In my opinion, Malaysian students must be like that for English language courses. (JustinIntT3L482-484)

He believed that where language learning was concerned, students should be provided with a rote learning environment. Although in this instance he had a traditional approach to teaching, Justin also reported efforts to increase students’ motivation in language learning and change their learning habits.

I love making changes. I did show and tell. At first they were not motivated. But in the end they started to enjoy it because they get to laugh at their friends and learn more about their friends. (JustinIntT3L208-213)
Here, Justin exercised the agency to move from focusing on language accuracy and teacher-centred activities using a transmission mode, to adopting interactive techniques to encourage students’ participation in language production. In both of his accounts above, Justin seemed to have lost his ESP identity when he managed students who had limited proficiency in English. Although he had the expertise to position himself as an ESP educator (as discussed in Section 6.3), he chose to return to his ESL identity.

In Jamal’s case, he found that it was a challenge to make students speak in English.

*Sometimes you really have to force students to speak [in English]. I find it a constraint. You can’t really force them to speak. No time for that.* (JamalIntT6L196-198)

Jamal reported that his students were generally motivated in learning but lacked motivation to use the language.

*The students are motivated but they are just not capable. They don’t have the skills in English language. Some of them could not participate in class. There are those who speak more than others. And there are those whom you really have to force to speak.* (JamalIntT6L192-194)

Both of his accounts above suggested that Jamal was struggling in deciding on the emphasis of his teaching due to the students’ limited ability to speak in English. This limitation may hinder or slow down the process of Jamal becoming an ESP educator.

From Mat’s perspective, his students were generally of low to intermediate English language proficiency.

*When I started here, I had high expectation[s] of the students where they can speak ... English [proficiently]. But I thought wrong.* (MatIntT1L124-129)

Based on his perceptions, two issues were raised. First, the students did not meet Mat’s expectation about university students in relation to their performance in English language. Second, the proficiency level of students who had attended his classes so far had not been up to his standard since he started his teaching career at this university. Realising that his initial perceptions of the students were inaccurate, Mat repositioned English language teaching at this university and reconsidered his teaching approaches to accommodate students of limited proficiency in English. This suggests that Mat had repositioned English language teaching. This repositioning may or may not transform him into becoming an ESP educator.
Mila reported that various approaches were used in one class to address her students’ various language learning needs.

*You need to use different methods and different approaches to different kinds of students [in one class]. There are certain ways you need to approach them.* (MilaIntT5L36-38)

Being new to the teaching profession, she was frustrated about her unsuccessful approaches and linked them to her lack of experience in teaching.

*But sometimes the approaches I used were unsuccessful. It could be [on] my ... part [that I did not teach them well]. This happened back then when I was still fresh. It was basically because [of] lack of experience.* (MilaIntT5L40-43)

The complexity of teaching these groups of students in the teaching and learning process was not understood by Mila. Instead, being inexperienced and not trained as an educator was perceived as the cause of her unsuccessful teaching. In this instance, Mila was struggling in positioning herself as an educator, raising challenges for her to position herself as an ESP educator.

In Justin’s case, he encountered different groups of students where they were of mixed language performance and abilities in one class.

*Some of them were really good but some of them were really bad. So, it’s hard for me to cater for them. How to cater [to] those high proficiency levels but at the same time [to] cater [to] the needs of those with low proficiency levels?* (JustinIntT3L380-383)

He recognised that he lacked skills in catering for the broad diversity of students in his classroom.

*Some of the research that I studied showed that if we mix weak students with good students, sometimes it is not good because we have to focus [on] the weak ones. Sometimes I mix them, sometimes I group them together [the low proficiency]. But I don’t tell them why because I know they will lose confidence.* (JustinT3L385-389)

In this account, Justin encountered conflicts between grouping students of mixed language abilities together (his approach) and grouping students of the same language abilities together (based on research). He perceived that by grouping those with limited abilities together, students would lose confidence in language learning. However, if he grouped students of mixed language abilities together, he would not be able to concentrate on students who had limited proficiency.

*What I did was [a] station activity...I’ve got like three stations. One is for higher level, second level and low level. They will move from one level to another. So, there will be three different types of tasks, beginner, intermediate and the expert.* (JustinT3L391-395)
These tensions were negotiated by using practices such as differentiation in grouping which he thought best addressed the language needs of students of all proficiency levels. The excerpts above showed that Justin had strong identities as an ESL educator as he expressed the need to address students’ limited proficiency in English. This finding suggested that students’ limited proficiency in English could hinder EL educators from shifting from being ESL educators to becoming ESP educators.

Mat reported similar beliefs about grouping students of the same proficiency level together. He argued that grouping the students in this way seemed to label the students.

*It might be prejudice and stereotypical, unfair too. But if I can group them, it will be easier for me to approach them.* (MatT1L323-324)

However, he found that this approach was convenient to monitor the students’ progress and address their language needs. There were tensions between being prejudiced towards and unfair to students (which could have negative impacts on students’ motivation or attitude towards language learning), and the convenience of managing student learning (ensuring that he provided sufficient language learning space for all students).

In addressing the language needs of students with limited proficiency, another practice that the participants reported was the use of bilingual strategies when giving instructions and during interactions with the students. This practice was reported by Jamal and Justin who allowed students to code-switch during interactions. They would also code-switch when giving instructions to ensure that students understood their tasks and used the language.

*Sometimes I have to [use a] bilingual [strategy]. You [may have] thought that they [understood] you but the following week you look at their assignment and you can see [whether they have understood]...sometimes you feel guilty. Either they fail to understand or I fail to deliver, you know. So, I have to tailor my teaching to their needs.* (JamalT6L321-325)

*I ask them to talk in English and [tell them] they can’t talk in Malay. If they really do not know, they can talk in Malay. But they have to talk in English.* (JustinT3L336-338)

Code switching (or bilingual strategy) is a common practice by ESL educators in a second language setting when teaching a content-based course to students who had limited proficiency in English (Ariffin & Husin, 2011) to facilitate students’ understanding of the classroom instructions given by the educators (Ahmad & Jusoff, 2009). In the context of ESP, the findings in this study raise tensions for EL educators to develop ESP identities and transform their ESL pedagogies into
ESP when students are of limited proficiency levels. First, when students’ first language is used to aid them in understanding content and instructions, EL educators may not be able to focus on teaching the language used in a discipline-specific context. Second, EL educators’ ESL identities appeared to be dominant when they became concerned about addressing language needs of students with low proficiency levels in English. As a result, they may experience tensions between maintaining their identity as ESL educators and becoming ESP educators.

Experiencing tensions and conflicts are part of the negotiation to reconstruct professional identities and can be found in a number of studies (e.g. Hao, 2011; Kostogriz & Peeler, 2007; Sannino, 2010; Tsui, 2007). Previous studies have investigated tensions between personal beliefs and institutional rules (Hao, 2011), between personal identities and prescribed identities and fitting in the institutional communities (Kostogriz & Peeler, 2007; Tsui, 2007), and expressing conflicts to overcome tensions (Sannino, 2010). The findings of the current study extend previous research by providing an example of negotiating tensions related to classroom practices resulting from teaching beliefs and students’ inability to comprehend the given tasks and the content of the English language courses, and how these tensions were negotiated through reflexive deliberation. The findings in this study also contribute to our understanding about the tensions and challenges for EL educators to shift their professional identities from ESL to ESP educators.

In Justin’s case, bilingualism was practised to provide more opportunities for language production among students. He commented that “In Malaysia, students are not given opportunity to talk” (JustinT3L183). Therefore, by allowing students to use their first language when necessary, he believed he instilled confidence in students in using English. In Justin’s account, he showed that it was necessary for him to shift from an ESL educator who used English in his instructions and interactions to a bilingual educator who used his first language (also the national language) in his teaching to help students increase their confidence and motivation. Both Justin and Jamal demonstrated that their teaching approaches and strategies were negotiated, largely to accommodate students’ English language proficiency. In addition, their professional identities were fluid where they shifted from one who emphasised language accuracy and the use of no language other than English, to the professional identity of bilingual educators as they understood their students better. However, their ESL identities were so dominant that ESP identities were lost. This suggests that students’ proficiency levels in English play important roles in the process of moving from being ESL educators to becoming ESP educators.

Findings about the ongoing process of developing professional identities through interactions with institutional contexts and negotiating tensions were reported elsewhere (Oruç,
For example, Oruç (2012) found that teacher trainees developed their professional identities through negotiation between their personal and professional beliefs in their understandings about teaching. Rus, Tomşa, Rebega and Apostol (2012) identified elements that teachers negotiated to form professional identities. Viczeko and Wright (2010) reported on the ongoing process of developing professional identities through reflection experienced by teacher graduates in the process of becoming a teacher. While these studies reported findings related to early career teachers, the findings in the current study demonstrate how experienced educators went through an ongoing process of negotiating their professional identities as they learnt more about their students’ language learning needs.

6.4 Conclusion

The dissemination process of the engineering accreditation requirements has diffused the demand for ESP. The absence of this demand created ambiguities in the type of English language courses designed, in positioning English language teaching and in the type of soft skills developed. As a result of these ambiguities, the English language courses designed, the type of English language taught and the soft skills developed did not align with the requirements of the engineering accreditation.

Ambiguities in understanding and assessing soft skills are found in several studies (Chell & Athayde, 2011; Nikitina & Furuoka, 2012; Shakir, 2009). The results in this chapter build on these findings by identifying forms of these ambiguities in understanding problem solving skills. First, teaching problem solving skills was about creating or innovating ideas to solve problems. Within this context, communication skills involved may be for a specific context. The development of this type of soft skill aligns with the requirements of the engineering accreditation. Second, teaching problem solving skills was about students experiencing self-discovery learning and not about the solution for a problem. Third, teaching problem solving skills was about using the language throughout the process of problem solving. The problem solving process was viewed as the medium for interactions or communications in general contexts. Of all the understandings of problem solving skills, only the first understanding was relevant for engineering while the other two did not align with the requirements of engineering accreditation. These various understandings created challenges for EL educators to address the type of soft skills demanded by the requirements of engineering accreditation.

The findings discussed in this chapter also revealed that the participants had strong identities as ESL educators and struggled to position themselves as ESP educators who addressed the requirements of the engineering accreditation. The challenges in developing professional identities
among ESL teachers are discussed in several studies (Oruç, 2012; Rus, Tomşa, Rebega, & Apostol, 2012; Viczko & Wright, 2010). The findings in the current study illustrated how all of the participants recognised the need to move towards becoming ESP educators but some of them (Mila and Jamal) were not able to view themselves in this way. In addition, the findings in this study also identified the factors which could hinder EL educators from shifting from ESL to ESP. These factors are the locations of the English language courses in the engineering academic curriculum, students’ limited proficiency, the low priority given to the English language courses by the students and the university, and the time allocated for the English language courses.

In conclusion, the filtering of the engineering accreditation requirements via university objectives and course learning outcomes resulted in misalignments between the type of ESP articulated in the engineering accreditation requirements and the type of ESP understood and conceptualised by the participants. The findings in this section raised the role of the dissemination process as the first stage towards the shift from ESL to ESP, giving opportunities for EL educators to understand their institutional contexts and position themselves as ESP within these institutional contexts. The findings also raised the role of agency in the positioning of English language teaching and professional identities to shift ESL educators towards becoming ESP educators. The role of agency is discussed in details in the next chapter.
Chapter 7  Towards Teaching English for Engineering

The analysis of the interview data in Chapter 6 concluded that the participants’ limited understandings of the engineering accreditation requirements impacted on how they positioned English language teaching in ways that affected their identities, and the development of English language courses at this university. The analysis also highlighted that the participants’ limited understandings of engineering accreditation requirements created professional challenges in positioning themselves within the discipline-specific context of the university, and they reported adopting multiple identities when managing their teaching. This chapter examines the participants’ perceptions of teaching English for engineering, particularly teaching problem solving skills, to better understand the challenges for these EL educators and in what ways professional agency plays a role in English language teaching within a discipline-specific context.

7.1  Responding, Interpreting and Reframing ESP Teaching

The analysis of the participants’ interview data highlighted the role of professional agency in the ways Mila, Jamal, Mat and Justin exercised their agency in managing their teaching within a discipline-specific context. Petrovic and Kuntz (2013) outline three strategies for exercising agency in implementing a policy which are, a) responding within existing frame, b) interpreting existing frame and c) reframing. In responding, educators teach according to what has been outlined in the syllabus. In interpreting, educators recognised the need for ESP and address this need in ways they think they are expected to. In reframing, educators recognised the need for ESP and address this need in their own way. In the context of this study, the participants recognised the need for ESP but were unclear about the need for ESP in engineering. Therefore, they managed their teaching based on how they interpreted their institutional contexts, including the English language course syllabus and their students’ English language performance.

When examining the content of the English language courses, Mila acknowledged that she needed to address the content outlined in the syllabus but perceived that she needed to focus on language as well.

For technical writing...you actually need to follow the format [content], at the same time you need to watch out for the language. (MilaIntT5L 250-253)
In this instance, Mila interpreted the content as needing to balance between teaching content and language. In this way, she appeared to be moving towards ESP. However, her concerns about accuracy in language production were strong.

So I would first focus more on the format [content], so that they get the format [content] right. And then I would focus on the language so that they would get the language right. (MilaIntT5L255-256)

In this account, Mila placed language accuracy as a high priority in language learning and positioned English language teaching as teaching a second language that focused on enhancing students’ levels of proficiency. Within this context, Mila positioned herself as an ESL educator within a discipline-specific context.

...the content of all the English language courses is still a bit general ...it is up to the [EL] educators to put it into [discipline-specific] context. (MilaIntT5L260-264)

In the excerpt above, Mila perceived that the English language courses were for general contexts and have reframed English language courses as ESP for engineering. In other words, she saw opportunities to move towards becoming an ESP educator who would contextualise her teaching for the engineering discipline. However, despite recognising these opportunities, Mila resorted to positioning English language teaching ESP for general contexts.

I usually give them clues on how they can correct themselves rather than me feeding them on the spot. My focus is more about communication rather than about the language. (MilaIntT5L153-155)

Through her interpretation, her priority on language accuracy in language production contradicted her accounts about focusing on communicative abilities.

It is very important for students to produce accurate English language. But I don’t think it is easy for them especially looking at their [low proficiency] level. (MilaIntT5L144-146)

In this account, Mila revealed her strong identity as an ESL educator, indicating that she was still struggling in positioning English language teaching and herself within her university contexts. As she moved from ESL to ESP and back to ESL, the type of agency Mila exercised changed from responding to interpreting to reframing. Her reframing brought her back to becoming an ESL educator, rather than consistently moving towards becoming an ESP educator.
Jamal reframed the English language courses to address students’ communicative abilities rather than on developing the language because he perceived there was limited time to teach about the language.

*I focus more [on] communication. As long as they are able to deliver something, speak something, sometimes we just have to ignore [language errors]. Because [there’s] so little time to correct them.* (JamalIntT6L184-187)

In this instance, his concerns about limited time caused Jamal to be flexible about language errors and to focus on communication instead. He expressed frustration about being unable to address language accuracy and grammatical knowledge which he believed were important in language learning.

*It’s a bit too late to teach English at this university. They [have] limited time. There’s not enough time [to correct their language]. Sometimes I got frustrated because what I had done at boarding school I cannot apply here. You pity them. They actually understand the importance of English.* (JamalIntT6L170-175)

Jamal felt he had limited control over his own teaching because of time constraints, indicating that educators’ classroom practices may not necessarily be the outcome of their beliefs. Similar findings of tensions between teacher beliefs and instructional practices were also found in other research (Khonamri & Salimi, 2010; Li & Walsh, 2011; Phipps & Borg, 2009; Underwood, 2012). Among the factors which caused teachers’ instructional practices to diverge from their beliefs were time constraints, students’ attitudes and motivation, workloads and understandings about teaching and learning. In Jamal’s case, his inability to teach according to his beliefs revealed a sense of job dissatisfaction for not being able to replicate beliefs and pedagogies he developed previously (when he taught in a school) in his current workplace. His accounts raised conflicts about his professional identity between ESL and ESP whereby he was not able to maintain his ESL identity he had developed in his previous workplace in this university.

In their study, Boyd and Harris (2010) found that teachers in UK who became university lecturers maintained their professional identities as teachers rather than as academics and fell back on their existing pedagogical knowledge as teachers when they encountered uncertainty in their new workplace contexts. In Jamal’s case, the uncertainty created through these tensions was exacerbated by challenges in managing the limited time allocated to address students’ language needs, his perceived need to address language accuracy, and teaching English for communicative purposes. In addition, uncertainty about his institutional identity also created confusion in establishing the focus of the English language courses in this context. This indicated that while Jamal perceived that ESP
for engineering should be practised at this university he recognised that the English language courses had not been developed for this purpose.

*I think the English language course that we are teaching to the students are general English. So, we need to be a bit more specific, you know English for specific purposes. So maybe we need to cater the needs for different faculty. Maybe for mechanical, we could have one module and electrical maybe another module. You know, the terms used and then the task given to them should be different.* (JamalIntT6L255-260)

Jamal indicated that English language courses did not reflect ESP for a specific discipline and understood the need to customise English language courses according to the language needs of engineering. He had the idea of reframing English language teaching as ESP teaching but he struggled between an ESL and ESP identity.

*I just teach based on the syllabus but did not go so much into the engineering area.* (JamalIntT6L279-280)

In this excerpt, Jamal exercised agency using a responding strategy where he perceived that he only needed to address the content outlined in the syllabus. However, his strong identity as an ESL educator led him to exercise another strategy.

...*my focus is communication ... but I will correct whatever language errors that the students made.* (JamalIntT6L294-299)

In these accounts, Jamal illustrated the interpreting strategy. Despite his understanding about the need for ESP and what appeared to be a move towards becoming an ESP educator, Jamal returned to his ESL identity.

Both Mila and Jamal perceived that they needed to position English language teaching as ESP at this university. However, their identity as ESL educators was strong which limited them from moving towards ESP for engineering. Mat and Justin, on the other hand, had provided significant evidence of shifting from an ESL to ESP identity.

Mat, for example, perceived that the syllabus of the English language courses was only a guideline about the content that he needed to deliver.

...*the syllabus is a guideline to meet a set of objectives rather than ways of teaching towards certain classes. Because we are different, it is wrong to assume that each lecturer is able to produce the same thing using a standard set of process[es]. I am better in using [a] certain approach. Another lecturer might be better with another ... approach.* (MatIntT1L388-393)
He perceived that the ways to deliver the content were flexible and depended on the interpretations of each EL educator. In this account, Mat illustrated a sense of reframing in his agency where he understood the content that needed to be delivered but perceived that he could address the content in his own way. Within this context, he positioned himself as an ESP educator. However, this positioning was challenged by his dilemma in deciding the focus of his teaching when dealing with students with limited proficiency.

*The communication course puts me in a dilemma. To me, the course is content-based. It’s not about English but communication. Based on that rationale, students should have the aptitude for it. If we were to give them group discussions, they should conduct it in English. But that doesn’t happen. They will discuss in Malay. Production is in English but the process is not. It’s very difficult.* (MatIntT1L204-211)

He pointed out that the limited proficiency of the students and their resistance to using the language interfered in achieving the aim of this course, causing frustration. In this instance, Mat struggled in maintaining his identity as an ESP educator. However, reframed the syllabus of the Communication course and was able to resolve this issue for that course.

*I’m more focused towards the process so that creative ideas or new ideas can be produced. So, that’s my main objective. Normally they will revert to their mother tongue to discuss. But I demand that the result of discussions ... be written or reported in English.* (MatIntT1L360-363)

In this account, Mat focused on the process of learning and the language aspect was dealt with when the process had been completed. In this instance, Mat was transformed into an ESP educator who focused more on the process and paid limited attention to the language.

Justin’s response to interview questions revealed that he positioned English language teaching differently according to the nature of the English language courses that he taught, which were Academic English and Communication. For the Academic English course, Justin perceived that the course aimed at preparing students for the MUET examination, focusing on enhancing students’ proficiency levels in listening, speaking, reading and writing skills.

*When I teach academic English, I will focus on grammar. I will be very strict about the language because I’m preparing them for MUET. For communication, if I emphasise grammar, students will not express their opinions. So I will be flexible with grammar. But I will correct them when they produce wrong grammar.* (JustinIntT3L315-319)

Thus, he positioned English language teaching as a space for teaching about grammatical knowledge. In this instance, his identity as an ESL educator was strong. However, when he
designed his instructional practices for Communication course, he positioned English language teaching differently.

For Academic English, I will just focus on the language and not the content because the content is not important. For communication, I can do both [content and language]. I can fix the language while doing the content. (JustinIntT3L352-358)

In this account, Justin illustrated flexibility in positioning English language teaching and in positioning himself within his university contexts. For the Academic English course, he demonstrated agency through interpreting the needs to address students’ language proficiency and to pay limited attention to the content. In this case, he positioned himself as an ESL educator. For the Communication, he reframed the course so that he could address both the content and language proficiency simultaneously, positioning himself as moving away from ESL towards ESP. In both cases, Justin shifted between ESL and ESP whenever he was required to do so.

This section highlighted that Mila and Jamal struggled to move towards ESP due to their strong ESL identity, pulling them back towards ESL. Mat and Justin, however, were moving towards ESP. The deeper analysis was undertaken to understand how they made this move. This is discussed in the rest of the chapter.

7.2 Making Meaning of English Language Teaching

The analysis of the classroom observation, stimulated recall and interview data showed evidence that Mat and Justin made efforts to relate English language courses to the engineering discipline despite their vague understanding about the requirement for ESP by engineering accreditation documents. The move towards teaching ESP was guided by their agency to make meaning of English language teaching within the university. This was associated with how they understood the learning outcomes and the content of the courses that they taught, and what they knew about their students. The next section discusses how Mat and Justin delivered the content of the English language courses.

7.2.1 Reframing the English language courses

Mat’s and Justin’s instructional practices were shaped by their understandings of the learning outcomes and the content of the English language courses. For the Communication course, for example, the learning outcomes were (a) to develop oral and written English language competence in a wide range of contexts, (b) to train students to work collaboratively with people of various cultures and professional backgrounds, and (c) to develop lifelong learning skills for continuous personal and professional development. The content included setting up a business,
conducting a survey and reporting findings. The syllabus required the students to imagine that they had provided services or sold products to customers and they needed to gather feedback from the customers. In one of the lessons Mat informed his students:

*Mat: Some other [students from other] sections [who attend classes] with other lecturers, when they interview people they would have to imagine that they had sold their products. So, they asked people whether people like their products. In our class, we do it differently. We have not sold the product yet but we are getting information from people [about] whether they are interested in our idea [about the business] or not.* (MatVR2E3)

He explained to his students that he addressed the content in ways that differed from other lecturers’ approaches. During the stimulated recall protocols, Mat explained that:

*The students are required to identify a business opportunity. In the module [syllabus] it is asked that they just sit down and then think of a business and then think of the objectives for the business. The way it should be is that they have already run the business and sold their products. But I did not go that far. I just want this to be like a business proposal. Not actually selling it.* (MatSRP2T13)

Mat demonstrated that he understood what he was expected to do but decided to address the content in a different way. In other words, he reframed the English language course he was teaching. He believed that the way he executed his teaching was more relevant and comprehensible for the students.

*Interviewing people as if they have already sold it is working with something that is intangible. That is actually two tasks at one time. First they need to interview people. Second, they need to interview about something that hasn’t really happened, but [made]-up. If I were to give them something imaginary, it will not be as effective as compared to something which is more concrete. I want them to relate to something that is real, something concrete because to me, [a]more concrete problem will lead to [a]more concrete task. But I did not stray away from the course outline. Just interpret the problem. The tasks are still the same.* (MatSRP2T13)

Mat argued that the tasks designed lacked authentic learning experiences and this could limit student learning. Therefore, he felt that he did not need to follow the guidelines in the syllabus strictly as long as the learning outcomes were addressed and the main tasks were performed.

*The subject itself; the content has a set of objectives that need to be fulfilled. I took the liberty of interpreting them differently ... to achieve the same objectives because I think I am able to do it more effectively if I were to use my interpretation.* (MatSRP2T13)
The two instances above (MatSRP2T13 and MatSRP2T13) demonstrated the process of reframing. Mat advocated that students should develop their knowledge through authentic learning experiences. Therefore, he exercised the agency through reframing the course content to provide learning experiences without the need to closely address the syllabus as long as the three learning outcomes were met. According to Priestley et al. (2012), teacher agency is exercised through interactions between the teacher and the contextual factors. In addition, Archer (2003) argues that agency is exercised through “reflexive deliberations” where teachers determine their practices under the circumstances of their teaching aims (p. 135). In Mat’s case, through his interactions with the course syllabus and reflexive deliberation, he reframed the content.

This finding showed that the ambiguities of the engineering accreditation requirement for ESP created opportunities for the English language educators to address English language teaching in their own way. Syllabus may restrict educators’ teaching practices and strategies when they are expected to strictly follow the details prescribed which may also restrict their agency in teaching and learning (Feryok, 2012). In Mat’s case, the ambiguities allowed him to reframe the English language course the way he wanted. This finding highlighted that Mat was shifting his identity from ESL to ESP although understanding about the requirement for ESP by the engineering accreditation was limited.

There was limited evidence that teaching language structure and grammatical knowledge took place explicitly in Mat’s classroom. Earlier in this chapter (Section 7.1), Mat indicated his dilemma in teaching the Communication course between emphasising delivering the content and teaching the language. He also indicated his frustration when English language was not utilised by students during group discussions. However, his perceptions of his students’ language needs had led him to reframe the Communication course.

> These students are engineering students, not TESL students. When I teach them, I’m more concerned about productive skills or communication skills. Not much about accuracy so long I can understand, so long as other students can understand what they say, that’s enough for me. (MatInfT1L108-110)

In this instance, Mat reframed English language teaching as one that paid less attention about language accuracy but about the language needs of the engineering students. This finding aligns with other studies of English in various disciplinary contexts which have reported the ESP teaching that addressed the language needs of a discipline (see Kuteeva & Airey, 2013; Popa, 2013). Thus, his instructional practices were aimed at students producing the language to fulfil tasks for this course rather than concentrating on teaching the language. This finding provides further evidence of Mat shifting from being an ESL to ESP educator in this university.
In Chapter 6 (Section 6.3.2), Justin demonstrated strong identity of an ESL educator whereby he believed in teaching grammatical knowledge to achieve language accuracy in language production for all the English language courses that he taught. However, his emphasis differed according to the learning outcomes of each English language course.

When I teach the Communication course, if I focus on grammar, I will not be able to get them to express their opinions. So I will put grammar aside, but it’s not like putting it aside just like that. I will correct them if they do wrong [in the language]. (JustinIntT3L317-319)

In the Communication course, the main aim was to develop students’ communication skills for a wide range of contexts. Although grammatical rules were addressed, they were not prioritised. In other words, his ESL identity was marginalised.

When I teach Academic English, I will just focus on grammar. I will just focus on the language itself and not the content. I taught them parts of speech. Two weeks before when I started with writing skills I taught them tenses. (JustinSRP1T9)

From Justin’s perspective, the main aim of the Academic English course was to develop English language communicative competence and to prepare students for the Malaysian University English Test (MUET). Thus, Justin exercised his agency through interpreting that explicit learning of grammatical rules, concentrating on tenses to teach writing skills, was required for Academic English. In this instance, his professional identity as an ESL educator was strong.

Justin: Today, I’m going to continue with writing skills. Last week what have we learnt?
Class: Grammar.
Justin: Grammar is broad. What did we learn on grammar?
Class: Past tense, present tense, future tense.
Justin: What are those called?
Class: Tenses.
Justin: To write an essay you must know how to construct a sentence. To construct a sentence you must know about parts of speech. (JustinVR1T27)

Based on the two accounts earlier and the episode above, Justin reframed the Communication course differently from Academic English. Thus, when teaching the Communication course, Justin reported that he emphasised language production with limited attention to grammatical rules. However, when teaching Academic English, which was for academic communicative competence and for MUET preparation, he explicitly taught grammatical rules. In the Communication course, he illustrated a professional identity as an ESP educator while
in Academic English his professional identity was as an ESL educator. This finding aligns with Norton and Toohey’s (2011) notion that agency can be fluid, that is, changing from exercising agency for one intention to another. In Justin’s case, fluidity was enabled by the interpreting and reframing strategies that he used. This fluidity was also demonstrated by Justin when he examined further the content of the Academic English.

_When I got the module [for Academic English], I ran through all the pages. And I saw that this is exam-oriented. It’s about test, about assessment...I always facilitate them that they have to refer to the module. But at the same time, I teach them using my own stuff that I’ve got from a forum on the internet._ (JustinIntT3L226-234)

_My teaching will be based on the syllabus. I cannot stray away from the syllabus. But mostly I will use my own materials._ (JustinIntT3L427-432)

This instance provides evidence of Justin changing from interpreting to reframing for the same course, in this case Academic English. He perceived that his department required him to address the module (syllabus) but he felt that the content limited students’ language learning as the nature of the course was largely exam-oriented. While the syllabus was addressed, additional knowledge and skills were added to the existing syllabus. This finding highlighted that the strategies for exercising agency do not occur separately but may be continuum or iterative.

This section analysed how Mat and Justin managed their teaching of the content of the Communication and Academic English courses. The findings revealed the types of agency used (responding, interpreting and reframing) teaching the English language courses and how these strategies impacted on the participants’ professional identity. The findings also illustrated that the types of agency may shift from one strategy to another according to how the contexts are perceived. This flexibility led to fluidity in professional identity (for example, Justin), shifting between ESL and ESP identities. Findings about the fluidity of professional identities through interactions with the classroom environment and negotiating tensions were reported elsewhere (Oruç, 2012; Rus, Tomșa, Rebega, & Apostol, 2012). The finding in this study highlighted the relationship between the types of agency and professional identity. This relationship impacted on Mat’s and Justin’s practices in teaching problem solving skills. The next section analyses how Mat and Justin managed their students’ language learning.

### 7.2.2 Managing students’ language learning issues

In Chapter 4, the document analysis indicated that the students’ entry level in English language performance was very low. The analysis in Chapter 6 revealed that the engineering students comprised students who were of mixed language abilities. The analysis also showed that
students demonstrated unsatisfactory attitudes towards English language courses. Questions about how ESL educators managed English language teaching to address these students’ language needs and negative attitudes were raised in these analyses. In this section, data from the classroom observations and stimulated recall were analysed and the results provided understanding about how students’ language learning anxiety shaped Mat’s and Justin’s agency and professional identity.

The analysis of Mat’s classroom observation data revealed that students faced challenges in expressing their ideas in English. In the following episode, Mat was conducting a brainstorming session about what students needed to do with the data they had collected. In this session, he created a space where students not only needed to generate ideas but also construct language so that the idea could be conveyed. In other words, the need for idea generation and language construction was shared in the same space.

Mat: After we have analysed, what do we do?
Student: [Softly] Report.
Mat: What?
Student: [Looked puzzled and unsure]
Mat: Yes. Good. The answer is not wrong.
Student: [Looked relieved]. (MatVRT25)

In this episode, the student involved only produced one-word answers without elaboration. Mat believed that all his students had acceptable proficiency levels and good ideas to share. However, they had difficulties in constructing the language to put their ideas across.

I assume that students have something to say but they don’t know how to say it. If provided enough time, they might be able to produce something. They might be able to express themselves. But this is a class setting. If we give them 5 minutes to answer, it might disrupt the whole class. Other students might get distracted. (MatSRP1T7)

In this instance, Mat perceived that lack of confidence in English language production hindered expression of ideas. There was a conflict between providing more opportunities for one student in his language production and maintaining the attention of other students in the classroom.

It’s very easy to assist communication but it’s very difficult to assist confidence. I can help students with words but to boost their confidence that is really [something they need to do] on their own. (MatSRP3T19)
Mat had positioned English language teaching as a space for idea generation and language production but students’ lack of confidence in English language production hindered the process of idea generation, creating conflicts for Mat to shift to ESP teaching, particularly in terms of teaching problem solving and communication skills.

Another factor which Mat perceived as hindering students from communicating their ideas and producing English language was the reaction of other students when a student made a mistake in language production. The following episode was about a student who pronounced the word *brochure* wrongly.

**Mat:** If you go to PC fair, you will collect papers from each booth. What do you call that?

**Student 1:** Brosur.

**Student 2:** “Brochure” not “brosur” [correcting the pronunciation of the first student]

**Class:** [The whole class started laughing]

**Mat:** [Looked at S1] They don’t know English as much as you [and yet they are laughing at you]. I know English. That’s why I don’t laugh at you. (MatVR3T37)

Mat reported that the act of laughing at or correcting students’ English language errors by peers publicly was a habit among students at this university. As a result, most students avoided expressing their ideas or opinions, or responding to questions posed in an English language classroom.

> Students are like that. They like to laugh at their friends so much that it’s very challenging for them to volunteer in class. So, I took it lightly so that they will not feel challenged. I tried to tone it down by saying that none of their friends are better in English compared to them. (MatSRP3T19)

This excerpt and Mat’s comments support Horwitz, Horwitz and Cope (1986) who argued that fear of being negatively evaluated can be considered as language anxiety. This also aligns with Hashim and Isa (2012) who found that fear of being negatively evaluated for language production was the main factor for language anxiety among 40 Tourism and Hospitality students in one higher education institution in Malaysia. The episode in MatVR3T37 and Mat’s reflection in MatSRP3T19, provided an example of a strategy to deal with language learning anxiety.

Another strategy that Mat practised to deal with language learning anxiety was giving the ownership of learning to the students where they make their own choices in their learning. This practice could be observed in the following episode:
Mat: If you want to interview someone and you appear like a zombie, the person might not cooperate as much as you want them to... If it is an informal interview, you can dress up as you are now but you still need to introduce yourself, what you are doing and why. If you dress up formally, people will take you more seriously and people will respond more seriously. I leave that to you. You can choose either formal or informal. (MatVR1T25)

In this episode, Mat explained to the students the various approaches to interviewing people. He expected students to make their own choices about the learning process in order to complete the given task.

I give them the responsibility of learning. I want them to feel the ownership. [I want them to understand] that they are doing this because they are [participating in their] learning. They are not sitting in the class ... [and just] listening [to what is being delivered by their lecturer]. (MatSRP1T7)

In this account, Mat’s belief about students’ ownership of learning led him to reframe and position English language teaching as a space for students to construct their own knowledge and to make their own decisions in their learning. The agency he exercised could make learning more meaningful to the students, giving more opportunities for a space to teach problem solving skills, particularly in engineering, explicitly in his teaching.

Justin reported that his students felt insecure and thus, they hesitated in language production. Studies on hesitation in language production among Malaysian undergraduates have found that self-consciousness about accuracy in language production was a common cause for hesitance in language production (Chan & Zahar, 2012; Hiew, 2012). Feeling insecure in language production can be categorised as communication apprehension which contributes to language anxiety (Horwitz, 2010; Horwitz et al., 1986).

When I saw that they feel insecure in my class, I would ask myself, “What should I do? What should I do?” I would try to put a smile on their face. (JustinSRP1T9)

The excerpt above showed that Justin went through an ongoing reflection to address students’ language learning needs and struggled to determine the strategies to address students’ insecurity in language production, particularly in classroom interactions. The earlier section (7.2.2) had discussed how Justin shifted from interpreting to reframing in exercising agency when interpreting the Academic English course. The excerpt above showed how Justin shifted back to interpreting, and then to reframing of English language teaching when he encountered students’ language learning issues, through reflexive deliberation (see Kahn, 2009; Liggett, 2011), suggesting that his use of the strategies in exercising agency is iterative.
In his effort to support students who felt insecure, Justin applied the bilingual strategy where he code-switched to Bahasa Malaysia to make the students feel less threatened.

Justin: A simple sentence has only one verb. So, if a sentence only has one verb we call that a...?  
Class: [Silence]  
Justin: We call that a...? [While pointing to the words on the screen]  
Class: [Silence]  
Justin: Kita panggil dia apa [what do we call it]?  
Class: Simple sentence. (JustinVR1T27)

In this excerpt the students did not give any response until the question was posed in Bahasa Malaysia.

I know them. They knew the answer. The answer was there [on the screen]. It’s just they were afraid to talk. (JustinSRP1T9)

In this instance, Justin reframed his teaching to provide a less threatening learning environment to reduce communication apprehension. Justin further argued that the use of Bahasa Malaysia was vital to reduce insecurity among his students, and to increase their participation, permeating their language production.

I learnt that if you want to teach a second language you have to use that language in the class. You cannot speak the first language. That means you cannot speak Bahasa Malaysia. But when I was overseas, I read this book which said if you want to teach English, it doesn’t matter if you [use] a little bit of their mother tongue. Just to make it simple and authentic so that students feel secure with us. (JustinSRP1T9)

Another strategy used by Justin to reduce insecurity among students was the use of humour to create a relaxed learning environment.

Justin: Ok. I will give Hafis another 3 stars for his answer. Ok, now, examples of adverbs. Nadia, please drive carefully. Siti can sing beautifully. Nampak tak [Can you see that]? Dalam [In these] example[s] ada apa kat belakang [what do you have at the end]? Ada [It’s got], “ly” kat belakang [at the end]. Carefully, beautifully. Apa lagi perkataan yang boleh ditambah [What other words that you can add] “ly” kat belakang [at the end]?  
Student: Fly  
Justin: Berapa star kau dapat tadi [How many stars did you get just now]? 6 kan jisn’t it? Aku tolak [I take back] 2 star[s]. “Fly” [the participant and the whole class laughed. Even the student who made the mistake laughed]. (JustinVR1T27)
In this episode, Justin not only acknowledged students’ mistakes but also created a learning environment where it was not wrong to make mistakes. This episode also provided further evidence that the use of Bahasa Malaysia created comfortable and secure feelings among students to communicate their ideas in English. This finding supports studies on the use of first language and the target language (English) together which reduced language anxiety and raised awareness of the differences and similarities between first language and target language (Brooks-Lewis, 2009; Halasa & Al-Manaseer, 2012; Scott & de la Fuente, 2008).

The analysis of Justin’s interview data (in Chapter 6) and his classroom observation data (in the previous section) revealed that Justin’s instructional practices explicitly emphasised teaching grammatical rules.

*I know that this is only English for their basic knowledge. They are engineering students, not TESL students. They only attend English class once a week. It’s a bit hard for them to give responses in English.* (JustinSRP1T9)

However, he recognised that the language needs of engineering students differed from other fields such as TESL (Teaching English as a Second Language) where TESL students learnt to teach the language. Thus, the grammatical rules which he taught to engineering students were basic knowledge, different from grammatical rules learnt by TESL students who learnt the language for the purpose of teaching. He also acknowledged that these students did not have many opportunities to communicate in English as they mainly used English when they were in an English class which was only once a week. Thus, students would have difficulty in producing and utilising the English language. Although he acknowledged this situation, Justin also felt that he faced the pressure of ensuring that students achieve the required result in MUET.

*Even though I want to prepare them for their world, I have to consider their results in MUET. Without that they cannot go into the real world. They cannot get a job. They cannot get anything. So, at the same time I’m preparing them for the examination as well. So, I’m very strict about the language.* (JustinIntT3L323-327)

In his account, he identified challenges in developing communicative abilities in English among his students and in ensuring that the students achieve the minimum requirement of English language proficiency in MUET. These two accounts are evidence of Justin struggling to position English language teaching and to establish his professional identity, impacting his practices in teaching problem solving skills.

While Mat used reframing to make meaning of English language teaching, Justin moved between interpreting and reframing. The ways in which they positioned English language teaching
was based on their interpreted and reframed English language courses and students’ language learning issues, creating layers of complexities for teaching ESP in engineering. The findings showed the strategies in exercising agency are iterative.

Mat and Justin’s agency in positioning English language teaching for engineering had not only impacted the ways that they perceived English language courses and their students, but also the ways they transformed English language teaching pedagogies into ESP for engineering, particularly in terms of teaching problem solving skills. The next section discusses how Mat and Justin managed their teaching to teach problem solving skills.

7.3 Exploring Practices in Teaching Problem Solving Skills

When teaching problem solving skills, it is important to use a sequence or steps to help navigate the problem solving process (Cochran, 2006). In engineering, most problem solving frameworks were developed based on the work of Voss and Post (1988) and Sinnott (1989). Another framework developed by Woods et al. (1997) was used by Mourtos, Okimoto and Rhee (2004a; 2004b) in their study to investigate teaching problem solving in engineering. These steps involved defining the problem, exploring the problem, planning the solution, implementing the plan, checking the solutions and evaluating or reflecting. More recently, Welch (2009) conducted a study to investigate how engineering students perform problem solving tasks. He found that the majority of the participants demonstrated the use of a framework which included searching for a cause, identifying possible solutions and selecting the most probable solution, defining a plan for the selected solution, implementing the plan and evaluating the plan implemented.

In analysing the classroom observation, the video clips and the stimulated recall data to observe teaching problem solving skills, the framework developed by Welch (2009) was adapted. This framework was relevant for this study as it was the framework commonly used in engineering. The term used for the first process, searching for a cause, did not adequately represent the process of identifying problems and problem formulation. This process also involves not only searching for the cause of a problem but also exploring and understanding the nature of the problem, identifying the potential goal, identifying the possible causes and obtaining information related to the problem (D’zurilla, Nezu, & Maydeu-Olivares, 2004; Jonassen, Strobel, & Chew, 2006; Mumford, Reiter-Palmon, & Redmond, 1994). As problem identification and formulation are also outlined as the outcomes in the Engineering Accreditation Manual (EAM), the term problem representation is used to represent problem identification and formulation in this chapter (Mumford et al., 1994). The term and concept of problem representation were applied and this term replaced the process searching for a cause in Welch’s framework. Other processes in his framework were maintained. Therefore,
the process of problem solving that was observed in Mat’s and Justin’s practices involved problem representation, identifying possible solutions and selecting the most probable solution, defining a plan for the selected solution, implementing the plan and evaluating the plan implemented. It was noted that these processes would not necessarily be in sequence and it was not necessary for all the processes to occur in one lesson (Heine, 2010).

7.3.1 Mat’s experiences and practices in teaching problem solving skills

The findings in the previous section indicated that Mat concentrated on delivering the content and language production rather than teaching about the language. He delivered the content in his own way to achieve his teaching goal which was to create an authentic learning environment and transferred the ownership of learning to the students. The analysis highlighted that interactions in English were limited due to the students’ lack of confidence and fear of being laughed at, while interactions were part of the problem solving process, for example, in sharing ideas. In this section, Mat’s experiences and practices in teaching problem solving skills were examined to determine how he managed these interactions and taught problem solving skills.

In analysing classroom observation data, one of the classes that Mat taught consisted of 18 engineering students who worked in three groups. The following excerpt illustrated a session of problem identification as one of the stages in problem solving.

**Mat**: Movie trailers and TV advertisement are all visual promotional tools. What we are going to do for this subject is to [apply] both visual and written promotional tools [for your assignment]. [Mat drew a horizontal line in the centre to divide the whiteboard into two sections. Then he wrote the word promotional tools on the top left side of the whiteboard as a title]. What event are they having at the moment at “Dataran Anggerik” [Anggerik Square]?

**Student**: [Inaudible]

**Mat**: How do you know that?

**Student**: Banner.

**Mat**: Banner, Ok. [Mat wrote the word “banner” on the right side of the whiteboard]. Once there was a “Karnival Keusahawanan” [Entrepreneur Carnival] and then they [would] put this paper under the wiper [on the windscreen] of a car. What do you call that?

**Students**: Flyers

**Mat**: [Mat wrote the word “flyers” on the right-hand side column]. If you go to [the] PC fair, you [would] collect this paper from one booth to another. What do you call that? (MatVR3T37)

In this episode, Mat was conducting a brainstorming session to establish the problem identification for a task of promoting a business. When students shared their ideas about the types of promotional
tools, Mat wrote the point on the whiteboard. When asked about this practice during the stimulated recall protocols, Mat elaborated:

*When I use PowerPoints, I find that students are not able to recreate or produce work up to my expectation. Instead, they will be busy copying rather than understanding the content. Students will not recall much information. They did not really read what they have copied unless [they are] told that [a] quiz will come from these notes and then they will memorise it.* (MatSRP3T19)

Mat indicated that using PowerPoint slides limited students’ knowledge construction. He reported that copying notes was a habit that students generally performed for the purposes of assessment and not to assist them to understand the lesson. This finding could be linked to the issue of Malaysian students being passive learners and dependant on their lecturers to provide them with knowledge instead of constructing their own knowledge (see Gupta, 2013; Kuteeva & Airey, 2013). Thus, Mat used the whiteboard to write ideas generated by students.

*I write some points and then I’ll ask for students’ responses or opinions. I’ll add [these] opinions and responses to the board. If I use PowerPoints, I am leading the students to what I want them to think. But I want to make students think that what they say is correct. I want to make it like, this is what you said and what you said is correct. I feel they need to contribute to their own knowledge.* (MatSRP3T19)

In the above excerpt (MatVR3T37), Mat explained that he created joint ownership where he collaborated with the students in the learning activity in his effort to guide the students in constructing knowledge. This encouraged active learning which could promote higher-order thinking skills required in problem solving.

*I started by dividing the board into two columns; the right side and the left side. The right side, to me, is like a brainstorm[ing section], where we just throw ideas [around]. It builds up the background knowledge. The left one is the notes. So, from the brainstorm[ing session], I will arrange them into tree-diagram of some sort on the left side. So, it’s [a process of] diverg[ing] and converg[ing].* (MatSRP3T19)

His technique of using the whiteboard was not simply writing and displaying information. Instead, he believed that his technique could encourage students to be active in their learning and gain ownership in the knowledge constructed. In the above episode, although students gave one-word answers, the interactions prompted students to think of the words for the concepts or descriptions given. The technique he used to write ideas generated through the brainstorming session on the right-hand column (diverging), and organising and selecting ideas (converging) demonstrated how the problem solving process was taught explicitly.
Another example of teaching problem solving was evident in the following episode. In this episode, Mat started his class with an evaluation of a task that students were required to implement after the previous session the week before. This episode illustrated a different process of problem solving which was evaluating the plan implemented.

Mat: Have you distributed the questionnaire?
Student: Yes and we have also collected them back.
Mat: Any problems?
Student: There are some who did not understand [inaudible]
Mat: So, that’s your main problem? Did they ask you any questions?
Student: Just the last question “How much are you going to spend for a car wash?”
Mat: Why did they ask you that question?
Student: Because they said this question is almost the same as an earlier question. (MatVR1T25)

Here, Mat assisted the students to evaluate whether the task completed was successful or whether there were difficulties that they had encountered. Mat’s questions and prompts in the interaction guided the students to evaluate their plans about the questions that they had designed and the distribution of the questionnaire. In the following account, Mat evaluated why a questionnaire was not successful.

Mat: When we sat down and discussed the questions, we were able to answer the questions ourselves. But when we give out [the questionnaire] to people, people cannot answer the questions, or they may not know how to answer the questions. This is one of the challenges. Perhaps these people are not involved in the discussion that we had before we come up with the questions. (MatVR1T25)

The actual process of producing the questionnaire could not be observed as the task was given to the students before this study began. However, Mat later explained the initial process through the stimulated recall protocols.

Before this, I gave the students the task to come up with the questionnaire. Before they make copies of the questions, they needed to email me a copy. So, when I was reviewing their questionnaire, I was striking a balance between language and content in the sense that language must be good but content should also be there. Some of the questions might be vague but should I let it be or should I correct it? But I was more concerned about why such questions were asked. (MatSRP1T13)

In the above excerpt, Mat reported that the task to develop and distribute the questionnaire had been discussed two weeks earlier. He reported that he guided the students about the content of the questions as well as the language. However, he expressed conflict between correcting students’
language and maintaining students’ original work. In his statement, “But I was more concerned about why such questions were asked”, Mat indicated that he required the students to justify their choice of questions. This part represents the process of selecting the most possible solution in the problem solving framework. As he was more concerned about the process of completing the task and the outcomes of the task, students’ grammatical errors were dealt with in an implicit way. In other words, grammatical knowledge was taught in context when grammatical errors occurred.

“If I give them [an] English lesson directly, it will not be as effective as in context. So this is grammar in context. But [it should] not [be] too much. (MatSRP3T19)

While problem solving skills were explicitly taught, English language teaching occurred implicitly but in the context of need. There was also a transfer of control from Mat’s guidance to the students over the completion of the task as students started to develop the skills for conducting a survey. This finding showed that Mat created joint ownership at the beginning of the task where he collaborated with the students in the learning activity. Later he transferred the ownership of learning to the students.

In another episode, Mat presented another task related to the data from the questionnaire.

Mat: Now that we have given people questions and we have received them [the responses], what do we do with them?
Class: [Silence]
Mat: You have data, we make an analysis. How do we analyse?
Class: [Silence]
Mat: There are a lot of accidents which involved cats. Every week, I see at least 3 or 4 dead cats on the road. From there I will say that 90% of cats died on the road. Therefore, I can say that the population of cats has declined because of the road accidents. So, we will find percentages. Now why do we do this?
Class: [Silence]
Mat: We want to know how much people are willing to spend for the “Language Translating Buzz” device. We want to know how often people wash their cars and how much they are willing to pay for automatic car wash. We want to know how many people are interested in the table that you plan to make. (MatVR1T25)

This episode illustrated problem representation whereby Mat introduced the students to a new task which was data analysis. He encouraged the students to explore the data and to suggest how the data could be analysed by asking open-ended questions. The interactions appeared to be one-way with Mat using a direct teaching method to teach problem solving skills as students were not responsive.
Most of the time, it’s not that they don’t know the answer but they don’t know how to answer. They have it in their mind but they need time to construct sentences. After that they have to worry [about] whether the sentences are grammatically correct or not. Because to them, if it’s grammatically incorrect, the lecturer will not understand them. If I throw a question to a student and he takes one minute to construct the sentence, the student himself will feel like [everyone is]… waiting for him. The whole class will have to wait for him and the whole class will be restless. (MatSRP3T19)

This account provided further elaboration about students’ need for time to construct language and about being concerned about grammatically correct sentences as discussed earlier in this section. Mat perceived that language accuracy in language production among the students was vital. The implication of this finding is that language production in English to communicate ideas interfered with interactions and slowed down the problem solving process. This finding supports a previous study which explored students’ performance in solving a second language (L2) grammar problem. In that study, Scott and de la Fuente (2008) found that students who used their first language in solving an L2 grammar problem demonstrated efficient idea sharing and interactions during the problem solving process while students who used L2 illustrated fragmented interactions to solve the problem. This highlights that interactions using second language were not smooth. In the case of this study, the use of English slowed down students’ idea sharing when performing the task, and reduced opportunities for students to participate in the interactions, and opportunities for problem solving processes to take place. In other words, students’ abilities to produce language could serve as a barrier to the problem solving process.

When I asked them to sit down and discuss among their group members, they will discuss in English only when I come to them. Most of the time, they will conduct their discussion in Malay. When they produced work, written work, they will produce [it] in English. So long as they can stand in front and present to the class, in English, [it’s] fine with me. (MatIntT1L205-219)

With regard to teaching problem solving skills, the flexibility in the language used to perform the problem solving task allowed the students to maximise the use of the space for problem solving. In relation to English language teaching, the use of English language was only required at the outcome stage, either orally or in written form. This demonstrated a kind of negotiation in teaching problem solving skills through English language teaching. This finding highlighted that when teaching problem solving skills was the focus, it was challenging to teach English explicitly.

The findings showed that Mat had positioned English language teaching as ESP which included teaching problem solving skills. The ambiguities of the requirements by the engineering accreditation gave Mat the advantage of reframing English language teaching according to his own
way. However, the ESP and the problem solving skills he taught were for general contexts and not specified into a particular discipline. Although he perceived the need for ESP, the type of ESP he perceived, particularly in his understanding of problem solving skills, differed from the ESP demanded for engineering. This shows that shifting from ESL to ESP for a specific discipline is challenging and may occur inconsistently.

7.3.2 Justin’s experiences and practices in teaching problem solving skills

From the analysis of his teaching and learning process, it was found that Justin focused on teaching about English and knowledge about grammar when teaching the Academic English course. He delivered the content this way as he believed that mastery of English started with mastery of grammatical rules. Similar to Mat’s experiences, Justin too encountered students who lacked confidence. Although he provided a space for two way interactions between him and his students, he preferred to be in control of students’ learning and that students should learn when he had delivered information. In this section, Justin’s experiences and practices in teaching problem solving skills are examined. The belief about teaching grammatical rules to assist students in mastering English and in language production is common in second and foreign language settings. This practice could be the impact of his belief about teaching English and his interpretations of the course syllabus where grammatical rules were required before students could produce the language, especially in writing skills.

Justin: What do you have in an essay?
Class: Sentence.
Justin: Sentences. Ok, what is a sentence? A sentence is a string of words satisfying the grammar rules, the grammar rules of a language [read from the slide]. It doesn’t matter in what language, any language. So, what is an essay? An essay is an analytic or interpretative literary composition which contains part of speech [read from the slide]. Do you have any idea what is part of speech? (JustinVR1T27)

In the excerpt above, Justin required students to recall information. In addition, Justin provided additional knowledge to build students’ existing knowledge to create new knowledge. This new knowledge was delivered to the students through PowerPoint slides.

This [PowerPoint slide] is the source of learning. I have to teach, I have to complete all the slides when the class ended so that when the class ended at least they got something. (JustinSRP2T15)

Here, knowledge building was about what was being delivered or presented (grammatical knowledge) to the students. He indicated that learning took place when all the information on the
PowerPoint slides could be presented to the students. Justin maintained the identity where he was the source of information and he delivered the new knowledge. In this instance the ownership of the learning belonged to Justin and he decided what students learn.

The slides are interactive and can help students [in learning the language], by hook or by crook I want to show it to them. Whether they want to listen to it or not, it’s my obligation to show them. (JustinSRP2T15)

In this account, Justin’s agency lay in delivering the knowledge for students to learn while the responsibility of learning was placed on the students. In other words, students were responsible for taking in the knowledge given and their agency to construct their own knowledge was limited. Justin’s pedagogies highlighted his identity as controllers of the source of information in teaching and learning.

The instructional practices demonstrated by Justin indicated teacher-centred approaches which could limit the space for teaching problem solving skills. However, evidence of teaching problem solving skills was found in the following extract.

Justin:

What is [a] compound sentence? [Then read from the PowerPoint slide] A compound sentence contains two verbs which are joined by a conjunction. [Shows a sentence on the PowerPoint slide] Where are the verbs?

Class: Barked and woke up.

Justin: That are joined by...?

Class: Conjunction “and”.

Justin: What is a complex sentence? [Read from the PowerPoint slide] A complex sentence can have more than one verb. [Continues to read from the slide] They usually have conjunctions and have main clause and subordinate clause [Then shows a sentence on the PowerPoint slide]. So, how is it different from compound?

Class: [Silence]

Justin: [Shows a complex sentence on the PowerPoint slide] A complex sentence has two verbs, just like compound [goes to the previous slide with a compound sentence]. It also has a conjunction [goes to the slide with complex sentence], just like compound [goes back to the compound sentence]. So, what’s the difference? (JustinVR1T27)

Here, the students were required to compare and explain the similarities and the differences between the two types of sentences. Teaching problem solving skills, which was problem representation, occurred implicitly in this episode. In other words, when the focus was on English language teaching, teaching problem solving skills was implicit. In this instance, he demonstrated a sense of moving from ESL to ESP educator teaching problem solving skills but in a generic context.
However, teaching and learning processes which included teaching problem solving skills in Justin’s classroom was inconsistent (occurring only as a small part of the whole lesson) and not as prominent as in Mat’s practices.

Justin: [What is a topic sentence?] Ok, [a] topic sentence. [Instructs the students to look at the PowerPoint slide] Look in front. [Reads from the PowerPoint slide] It is also known as main points. [Repeats] It is also called as main points. It means the points that lead to the main ideas. Ok, I said earlier that [a] topic sentence makes you keep on track. Now why did I say that? Why?[Pauses for a second]. Because every topic sentence is the main point of the...? Es...? Essay. So, if you look at the topic sentences, you can compare your...what? [Short pause and flipped to the previous slide] your main ideas. (JustinVR2T33)

In this excerpt, direct teaching was prominent. Although there were efforts to encourage students’ participation in their learning through prompts and questions, Justin limited the time for students to respond. He explained that his focus was on delivering all the information from the PowerPoint slides.

When I started the lesson, I [kept] thinking “Oh! My God! I have two [sets of] PowerPoint presentations that I need to present to the students. I worried about that [that I would not have enough time for them] too much. I was really in the position where “Ok, I’ve got two sets of PowerPoint presentations and I have to finish presenting both. (JustinSRP2T15)

In the above excerpt, Justin’s emphasis on delivering knowledge to help students master the language and on providing additional knowledge, reflecting a strong professional identity as an ESL educator. Opportunities for teaching problem solving skills were not present in this excerpt, indicating that a professional identity as an ESP educator was absent.

The findings in this section highlighted that Justin shifted from an ESL to ESP and back to ESL educator, with this shift occurring when Justin’s agency shifted from interpreting to reframing English language teaching within his institutional contexts. Thus, the ESP he conceptualised did not necessarily align with the ESP demanded by the engineering accreditation requirements.

7.4 Conclusion

English language teaching had been positioned as ESP for engineering at the engineering accreditation level but this requirement was ambiguous at the English language Department level. These ambiguities led to multiple ways in which these EL educators perceived English language courses, the types of agency they exercised and how they positioned themselves within the university contexts. Mila and Jamal, for example, perceived the need for ESP in their teaching. Due
to their limited understanding of the type of ESP required by the engineering accreditation requirements and their strong ESL identity, they struggled in maintaining ESP identity, and thus, returned to their ESL identity.

Despite ambiguities in the need for ESP, the analysis in this chapter revealed that Mat’s and Justin’s interaction with their institutional contexts led them to position English language teaching as ESP at this university. This finding supports the notion that teacher agency is exercised through interactions between the teacher and the contextual factors (Priestley, Edwards, & Priestley, 2012). The findings in this chapter revealed that the strategies used to exercise agency may shift from one strategy to another when the participants interacted with their institutional contexts such as the content of the English language courses and the students’ language learning needs through ongoing reflection of these contexts (Archer, 2003, p. 135), highlighting the notion that the type of agency used can be fluid, changing from exercising agency for one intention to another (Norton & Toohey’s, 2011). This fluidity can be a continuum or iterative.

This study also found that language anxiety was a contributing factor to issues of language production, similar to that found in the literature of language anxiety in the Malaysian context (Darmi & Albion, 2012; Hashim & Isa, 2012; Jain & Sidhu; Shah et al., 2013). The findings in this study extend the findings in the literature in that language anxiety about using English as a means of communication challenges the success of teaching ESP for a specific discipline, particularly teaching problem solving skills and teaching communication skills in English. In addition, this study found that the use of students’ first language and transferring the ownership of learning to the students could reduce students’ language anxiety. Studies on transferring the ownership of learning indicated that students became motivated to learn (Rahmat & Aziz, 2012; Borda, Kriz, Popejoy, Dickinson, & Olson, 2009; Zhang & Head, 2010). In this current study, giving the ownership to the students not only promoted their language learning, but also allowed the space for problem solving skills to be taught explicitly. On the other hand, when learning was controlled by EL educators, problem solving skills were taught implicitly. This finding highlighted the challenges for achieving effective ESP teaching in that EL educators need to recognise the type of soft skills and understand how to teach these soft skills for a specific discipline.

The analysis also generated understanding that inabilities to construct language within a limited time are factors which constrain teaching problem solving skills as students needed to interact with each other to share their ideas and opinions during the problem solving process. These constraints also impacted on these EL educators’ capabilities to reframe English language teaching as ESP for engineering that addresses teaching problem solving skills and teaching communication.
skills in English. In order to promote interactions to allow the problem solving process to take place, students were given the flexibility to use their first language during their discussions. In allowing this, the space for teaching communication skills in English was limited.

The discussion in this chapter focused on Mat and Justin as they demonstrated a shift from being ESL educators towards becoming ESP educators. The findings in this chapter highlighted the interplay among the strategies in exercising agency, professional identity and positioning of English language teaching which impacted the ways Mat and Justin conceptualised the English language courses. The strategies used in exercising agency may either be on a continuum, where EL educators may move from interpreting to reframing as they reflect and understand their institutional contexts, or iterative, where they interchange between interpreting and reframing. The findings also highlighted that although Mat and Justin had demonstrated a move towards ESP identity, their conceptualisation was a combination of ESL and ESP, with limited relationship to engineering or a specific discipline. Understanding their experiences and the processes of shifting their identity may help in developing ways to support EL educators teaching in a discipline-specific context better. Understanding how EL educators respond, interpret and reframe their institutional contexts may also help in developing ESP courses that address demands by engineering and other disciplines.

The next section discusses the key findings, the implications and the recommendations for this study.
Chapter 8  Conclusion

This chapter discusses the key findings and conclusions of the study and begins with a brief overview of the study. The main part of this chapter uses the research questions to structure the discussion of the key findings, highlighting the contributions of the study to the field of ESP. Limitations are identified and implications are raised for future research and practice.

8.1 Overview of the Study

The main aim of this study was to investigate the ways that English Language (EL) educators managed the complexities of English language teaching in engineering at an engineering university located in the second language setting of Malaysia. This study was guided by the following research questions:

1. How is English language teaching positioned in an engineering academic curriculum?
2. What are the complexities of English language teaching in engineering?
3. How do EL educators manage the complexities of English language teaching in engineering?

A case study design explored the ways that EL educators managed the complexities of teaching English at one engineering university where they were required to contextualise English language content into engineering fields, and to teach problem solving and communication skills in English. The data were collected using quantitative and qualitative methods to gain insights into the ways in which EL educators conceptualised teaching English, positioned themselves and framed their teaching in an engineering context, and managed the complexities of teaching English in this context. The quantitative data were collected through a questionnaire involving 12 EL educators. The questionnaire data were used to profile the EL educators at the English Language Department of this university. Based on the profiling, four EL educators who taught engineering students were selected for the main study. Qualitative data in the main study were collected through document analysis, individual interviews, classroom observations, video recording of classroom observations and stimulated recall protocols.

Overall, key findings of this study were related to positioning English language teaching, professional identities and agency. While engineering accreditation requirements had positioned English language teaching as English for Specific Purposes (ESP), the dissemination process of the engineering accreditation requirements caused the English language teaching to be positioned as
English for general purposes at the English Language Department level, creating disconnections between the intended curriculum and what was enacted. The findings revealed that these disconnections impacted on how English language teaching was positioned in the engineering accreditation requirements, by the university, the engineering faculties and the English Language Department, raising the complexities of English language teaching in engineering. The analysis of the Engineering Accreditation Manual and engineering programme descriptions (Chapter 4) showed that the English language courses were expected to address English language discourse and communicative abilities in English for an engineering context. However, when the course learning outcomes and the syllabus were analysed, the English language courses were not designed for engineering, but for English in general workplace contexts, indicating disconnections between English language teaching and engineering accreditation requirements.

The analysis of the participants’ perceptions, beliefs, and instructional practices about teaching English at an engineering university in Chapters 5, 6 and 7 revealed that these disconnections were caused by the fractured dissemination of engineering accreditation requirements. The multiple layering of the dissemination process contributed to EL educators’ limited understanding of engineering accreditation, ambiguities in positioning English language teaching and in the focus of teaching English, and EL educators’ struggles to create meaningful professional identities. Through this process, the demand for ESP was absent from the EL educators’ conceptualisations of English language teaching.

In Chapter 6 (Section 6.3), the findings highlighted the significant role agency played in the ways EL educators positioned English language teaching, managed their teaching practices and established their professional identities. Chapter 7 reported the strategies that the EL educators used in exercising agency and factors that contributed to exercising agency which could lead EL educators either to move towards becoming a professional as an ESP educator or to retain their strong ESL identity, suggesting that construction or reconstruction of professional identities is a complex and challenging process.

In the following sections, these key findings are discussed in more detail under each of the three research questions.

8.2 Research Question 1: How is English Language Teaching Positioned in the Engineering Academic Curriculum?

This study found that there were disconnections between English language teaching and the engineering accreditation requirements due to the multi-layered dissemination process from the
engineering accreditation body to the university to the English Language Department. These disconnections were reported in Chapter 4 (Sections 4.2 and 4.4) where engineering accreditation documents positioned English language teaching as ESP for engineering whereas the English Language Department positioned English language teaching as English for general purposes. When examining the engineering academic curriculum in Chapter 4 (Section 4.3), it was found that the curriculum was not structured to support ESP teaching. The English language courses were located in semesters where other courses were largely non-technical, for example, humanities, professional ethics and mathematics. In these semesters, students had not yet learnt about engineering fundamentals. This suggested that English language teaching was positioned as separate from engineering education which contradicted the requirements of the engineering accreditation that demanded ESP for engineering.

The focus on ESP for engineering was diffused when the graduate outcomes of the engineering accreditation were adapted at the university level when the Academic Department translated the graduate outcomes of the Engineering Accreditation Manual (EAM) and the Malaysian Qualification Framework (MQF) to create the university objectives. The demand for ESP for engineering was further diffused at the English Language Department level when these university objectives were further diluted as ESL teaching.

With the absence of learning outcomes that reflected English for engineering, the English language courses were designed with English for general contexts in mind. For example, one of the graduate outcomes of the EAM stated that engineering students need to demonstrate the ability to communicate effectively, not only with engineers but also the community at large, positioning English language courses as ESP for engineering. However, this outcome had been translated into developing English language competence for oral and written communication in a wide range of contexts, positioning English language courses as English for general contexts with the result that the requirements for ESP for engineering were not addressed.

The disconnection between English language teaching and engineering accreditation requirements was also reported in Chapter 6, this time from the EL educators’ perspectives. The absence of learning outcomes that reflected ESP in the English language courses resulted in challenges for the participants to position and conceptualise English language teaching (Section 6.2). This includes challenges in understanding the demand for teaching problem solving skills, creating tensions about the emphasis of teaching among teaching grammar and language structure, language skills, communication skills, and problem solving skills in their teaching. The need to teach problem solving skills added to existing complexities of teaching English at this university. In
addition, the study also found that the EL educators encountered challenges in developing their professional identities (Section 6.3) in that the participants who were trained as ESL educators had to resort to their ESL pedagogies in their teaching.

The findings in Chapter 6 highlighted that the disconnections between English language teaching and the engineering accreditation requirements were not only due to the multi-layered dissemination process, but also due to how EL educators positioned English language teaching within the university contexts and how they positioned themselves as ESP educators.

8.2.1 Diffusing the demand for ESP

The dissemination process of the engineering accreditation graduate outcomes from the Board of Engineers Malaysia (BEM) to the university and subsequently to the English Language Department removed the requirements for ESP for engineering and created ambiguities in conceptualising English language teaching at this university.

There were multiple ways in which the diffusion of ESP occurred. First, the dissemination went through three phases of adaptation (at university level), selection and translation (both at English Language Department level). Second, the EL educators translated the course learning outcomes (adapted from the university objectives) into their teaching. Third, the dissemination of the engineering accreditation graduate outcomes was only to selected EL educators. For example, in Chapter 6 (Section 6.1), Jamal reported that he had never heard about any engineering bodies but acknowledged that there were EL educators who could be well-informed as they were involved in the process. This meant that not all EL educators knew about engineering accreditation graduate outcomes and what knowledge they had varied from one EL educator to another. This also suggested that the EL educators worked in isolation, either from their colleagues or engineering educators. Teachers working in isolation have been reported in research which investigated how professional relationships in schools overcame or reinforced teachers’ isolated practices in teaching (de Lima, 2003). The results of the study showed that the workplace environment had a powerful impact on teachers’ practices, whereby the teachers were concerned about their own practices and that they preferred to work in isolation. In the current study, the design of the engineering academic curriculum separated English language teaching from the curriculum and positioned English language courses as stand-alone courses. Apart from that, ambiguities in the course learning outcomes produced variation in EL educators’ interpretations of the English language courses, resulting in a range of teaching focus. In addition, there were limited professional contacts between the EL educators and the engineering staff that limited EL educators’ understandings of teaching
and learning in engineering education. All these factors contributed to isolating practices in teaching.

Previous research has provided knowledge and understanding of the factors which contribute to the success of implementing a policy (Baldauf, Kaplan, Kangwangamalu, & Bryant, 2011; Kaplan & Baldauf, 2011). Ali (2013b) reported that the dimension of a policy and the mode of dissemination contributed to the failure of, and ambiguity in implementing language policies. She argued that dissemination should involve proper and full documentation. The findings in the current study extend Ali’s study not only in terms of developing our understanding of the dissemination process and mode of dissemination in this context, but also adding information that the dissemination process itself can contribute to the success or failure of a policy. The content of the policy needs to be strongly communicated at all levels and departments involved in enacting the policy. Having clear documentation in this instance was not adequate in supporting these EL educators to teach ESP in their classrooms.

Mohammad et al. (2012) who investigated the implementation of teaching approaches to address an outcome-based education system argued that developing clear documentation of a policy or a requirement was challenging and could still lead to ambiguity in interpreting this policy or requirement. Yusoff and Samah (2013) advocated that top-down instruction could ensure successful implementation of a policy in the Malaysian context. The findings in this study also extend Mohammad et al.’s (2012) study by providing new information about the kinds of filters that can contribute to ambiguity in interpreting a policy or a requirement. These filters are the process of selecting the university objectives to be incorporated into the course learning outcomes of the English language courses, and the dissemination of the requirements only to EL educators who were directly involved in the engineering accreditation process. This study, however, also challenges the notion that top-down instructions contribute to the success of the implementation of a policy in the Malaysian context (Yusoff & Samah, 2013). In this study, knowledge and understanding of a policy and the agency of the participants who respond to this policy are the major contributors towards successful implementation of the engineering requirements and implementation is not solely reliant on top-down instruction. This raises the importance for EL educators, in this and similar contexts, who are generally of ESL background, to be provided with opportunities and the agency to interact with engineering staff, to enable them to conceptualise English language teaching better and understand their position within their institutional contexts. The limited understanding about the engineering accreditation requirements reported by the participants in this study led to ambiguities in the role of English language courses within the
engineering academic curriculum. These ambiguities affected the design of the ESP courses developed at the English Language Department level.

Previous studies, conducted in India, raised the importance of the requirements for integration of English language and engineering courses to be explicitly articulated to the ESL educators and the need for English language skills for engineering to be identified (Venkatraman & Krishnamurthy, 2008; Venkatraman & Prema, 2007). The findings in the current study build on this knowledge by highlighting the impacts of ambiguities caused by the lack of explicit articulation of the requirements within an institutional context in South East Asia, particularly in Malaysia. Understanding these impacts could assist policy makers and course designers in developing policies, requirements and learning outcomes to be articulated clearly and accurately.

8.2.2 Misalignments in the role of English language courses

The dissemination process discussed in Chapters 4 and 6 indicated that there were misalignments between the type of English language courses articulated in the engineering accreditation requirements and engineering faculties, and the type of English language courses designed at the English Language Department Level. For the type of English language courses articulated by engineering stakeholders, the analysis found that English language teaching was positioned as part of the engineering academic curriculum and played a role in addressing the engineering accreditation requirements. English language teaching was therefore positioned as ESP for engineering, providing the learning space which supported the application of engineering fundamentals and communication skills related to engineering problems.

However, the analysis of the syllabus of the English language courses in Chapter 4 revealed that these courses were not developed to explicitly address English language needs in engineering. The courses were designed as English for general contexts, rather than ESP for engineering and the course learning outcomes did not articulate English language abilities, problem solving and communication skills in engineering. The expectations that English language teaching supported the development of English for engineering, as well as problem solving and communication skills in English, were absent from the course learning outcomes of the English language courses.

Research in English-speaking countries such as the USA, Canada and Australia, has found that English language courses were positioned as part of the engineering academic curriculum as intended (Abatzoglou & Boulos, 2005; Beck, 2004; Skinner & Mort, 2009). However, in non-English speaking countries, research on teaching English for engineering has focused more on
needs analysis, the communicative events in engineering and methods of teaching English for engineering (Kassim & Ali, 2010; Kaewpet, 2009a, 2009b; Moslehifar & Ibrahim, 2012).

The findings of the current study in ESL contexts are important in developing our understanding of the disconnections between English and engineering contexts, revealing that this connection may occur when the role of the English language courses within an engineering academic curriculum is not explicitly disseminated to the EL educators or clearly articulated in the course learning outcomes. Thus, language discourses used in engineering were not emphasised by EL educators teaching these courses.

8.3 **Research Question 2: What are the complexities of English language teaching for engineering?**

The study found that the challenge for English language teaching for engineering is to conceptualise English language teaching as ESP in an engineering setting. The EL educators needed to change their identity from that of an ESL to an ESP educator and to transform their ESL pedagogies which emphasise a mastery of language into language discourses and soft skills, such as problem solving and communication specific to an engineering discipline. In addition, the EL educators would also need to build knowledge about teaching problem solving and communication skills as well as the language discourses applicable for engineering contexts. The findings in Chapter 6 highlighted the role of agency in the shift towards teaching ESP.

8.3.1 **Transforming professional identities**

The analysis in Chapter 6 revealed the tensions and conflicts that impacted on the participants’ agency to negotiate and transform their professional identities as ESP educators as the participants attempted to move towards teaching English for engineering.

Mat, for example, provided an active learning space and taught problem solving skills explicitly, while Justin’s interests in car engines enabled him to integrate this knowledge into his teaching, reflecting ESP imperatives. Despite their shift towards becoming ESP educators, they struggled to conceptualise ESP for engineering. Mila and Jamal had strong ESL identities as bilingual educators, providers of authentic learning experiences, deliverers of knowledge, promoters of knowledge construction, and grammar teachers, and having limited knowledge and experience of being an engineer, they struggled to see themselves as ESP educators and retained their ESL identity. Jamal, for example, reported in Chapter 6 (Section 6.3) that the English language courses developed at this university needed to be revised and his pedagogies needed to cater for the language needs of engineering. However, his identity as an ESL educator with expertise in grammar
rules for mastery of English language in general contexts was so strong that he struggled to transform his pedagogies to meet the demand for ESP for engineering. Mila recognised the need for English language teaching to be transformed into ESP but her conceptualisation of ESP was limited as she did not have a teaching background and her expertise was in English language studies. These findings highlighted that shifting from one professional identity to another which is beyond an educator’s professional expertise is a huge leap for ESL educators. The complex process of professional identity transformation needs to be understood by the EL educators who are the agents who implement a policy, and the university administration and the policy makers who expect a policy to be implemented.

The findings also revealed that professional identities were not only multiple but also fluid. For example, Justin shifted from one who emphasised language accuracy and the use of no other language besides English, to the professional identity of a bilingual educator who understood his students’ needs and allowed them to communicate in both L1 and L2 in his classroom. In another instance, he shifted from being an ESL educator to becoming an ESP educator when he used his knowledge about car engines in his teaching. His interests in cars and engines had given him an advantage in moving from being an ESL to becoming an ESP educator. However, he remained unable to translate ESP principles in all aspects of his teaching. Findings about the fluidity of professional identities through interactions with the classroom environment and negotiating tensions were reported elsewhere (Oruç, 2012; Rus, Tomșa, Rebega, & Apostol, 2012). While professional identities can be fluid, the process of shifting from one professional identity to another is complex. Within the context of this study, these EL educators were involved in a process of interacting with institutional contexts, positioning and conceptualising English language teaching, positioning themselves within their institutional contexts and negotiating their professional identity and shifting to another identity.

The existing research provides understandings about shaping and reshaping professional identities of newly graduated teachers in their transitions from being a student to becoming a teacher and negotiating between theory and practice (Devos, 2010; Flores & Day, 2006; Kanno & Stuart, 2011; Olsen, 2008; Sutherland, Howard, & Markauskaite, 2010). In Mila’s case, she recognised that she needed to construct an ESP identity. As she did not have a teaching background, she was already struggling to shape her professional identity as an educator. The need for her to shift to become an ESP educator made the process more complex. Her experience develops our understanding about the struggle of an academic who was not formally trained to become an educator, and who had limited years of teaching experience, yet who was expected to become an ESP educator teaching in a discipline-specific educational setting. Her experience highlights the
complex nature of constructing a professional identity that meets her workplace demands which was unfamiliar to her. These findings are of value to other EL educators who are not trained to become an educator, but who are expected to construct professional identities required within their workplace contexts.

8.3.2 Building knowledge in teaching problem solving and communication skills

There were multiple ways in which the participants positioned problem solving and communication skills in English language teaching. First, English language teaching was positioned by the participants mostly the same way as in a school. This meant that teaching concentrated on teaching English as a second language for general purposes focusing on addressing students’ limited proficiency. With the need for ESP removed from the learning outcomes of the English language courses through the dissemination process, teaching problem solving and communication skills was not perceived as a significant part of English language teaching. Within this context, the design of the English language courses and English language teaching were not contextualised into a specific discipline. The English language courses were commonly designed by EL educators who were of ESL background. While teaching problem solving and communication skills may be considered in the design of English language courses and in English language teaching, the focus will be language needs and soft skills for general contexts, rather than for a specific discipline such as engineering. As a result, the type of communication and problem solving skills taught by EL educators misaligned with the type expected in the engineering discipline.

Second, English language teaching provided a space to transform the language learning environment from passive to a more active learning classroom more conducive to problem solving activities. Mat, for example, believed in giving the ownership of learning to the students, whereby students made decisions about how they were going to achieve their learning goals. Within this space, problem solving and communication skills were taught explicitly and the language needs were addressed within the context. However, as the learning outcomes of the English language courses did not reflect ESP for engineering, problem solving and communication skills taught suited for general contexts and were not specifically contextualised for a specific discipline. For the learning outcome “To train students in working collaboratively with people of various cultures and professional backgrounds”, for example, the need for teaching problem solving skills was implicit and was not clearly articulated. In addition, the need to address this learning outcome, specifically for the engineering discipline was not stated.

The analysis reported in Section 7.4 of Chapter 7 revealed that when English language teaching emphasised problem solving skills, limited attention was given to communication skills in
English. While the problem solving process required students to communicate ideas and share opinions, communication was seldom in English, giving limited space to address English language needs. Mat, for example, had indicated that he taught problem solving skills explicitly. However, he also reported that he allowed his students to use their first language during group discussion. In both instances teaching English was not the main focus. This meant that although he had moved towards becoming an ESP educator, his conceptualisation of ESP was about developing soft skills relevant for general contexts that did not align with the type of soft skills required for engineering contexts.

Second, when English language was the focus of teaching, problem solving and communication skills were marginalised. Justin, for example, reported that he focused more on teaching grammar rules and that the problem solving process was about conceptualising these grammar rules. He also reported that he framed his teaching to concentrate on language to address students’ limited proficiency and therefore the space to teach problem solving skills was implicit and almost absent. This suggests that the ways in which EL educators conceptualise problem solving skills may vary from the type of problem solving skills required in engineering. This finding highlights that the challenges in shifting from ESL to ESP identity for engineering also includes understanding problem solving skills in engineering and how to bring the two together.

Ambiguities in implementation are expected to occur when educators address requirements in areas where they have limited expertise. Affandi et al. (2012) reported that ambiguities in interpreting soft skills led to mismatches between the soft skills outlined in an engineering curriculum and the soft skills taught in the classroom. This study, however, has shown that these ambiguities become even more problematic when these soft skills and language needs are associated with discipline-specific content knowledge. In this context, the analysis of Mat and Justin’s practices reveal that these EL educators, although willing and enthusiastic, struggled to align competing priorities of developing language and developing skills in engineering as required by ESP. Understanding the priorities within university contexts, particularly in relation to English language teaching, can help EL educators to address specific English language needs and soft skills for engineering.

Mat and Justin demonstrated significant practices in moving towards teaching ESP, particularly in teaching problem solving and communication skills. However, they both appeared to be moving towards different types of ESP. In his classroom, Mat taught problem solving skills explicitly but he paid limited attention to communication skills in English. Justin, on the other hand, focused on developing language and his teaching of problem solving skills focused on solving students’ language needs. This finding highlights that although EL educators may develop their
understanding of ESP, however, their pedagogies may still not produce the outcomes intended by their institution. In addition, both Mat and Justin struggled in balancing English language, problem solving skills and communication skills. The three elements, problem solving skills, communication skills and English language, are equally important in enabling engineers to work in a team effectively.

These findings highlight the need to consider designing ESP courses and teaching strategies that can equally integrate knowledge and skills (soft skills and technical skills) relevant for a discipline. In addition, this finding raised the issue of transforming pedagogies associated with English language teaching into ESP for a discipline-specific context. Understanding the principles that underpin ESP as well as specialised language and soft skills specific for a discipline may lead to the development of effective ESP courses and assist EL educators to transform their ESL pedagogies into ESP pedagogies.

8.3.3 Balancing the English language needs in ESP setting

The participants in this study experienced tensions in managing their English language teaching. The factors that contributed to these tensions were the competing priorities of the stakeholders, students’ language anxiety and limited proficiency, and the location of the English language courses within the curriculum.

8.3.3.1 The competing priorities of the stakeholders

The findings in Chapter 4 (Section 4.5) indicated that one of the factors which caused the disconnections between English language teaching and engineering was the competing priorities among the stakeholders. The analysis of the Engineering Accreditation Manual (EAM) and engineering programme descriptions documents revealed that the engineering stakeholders expected that engineering graduates should be able to communicate effectively and proficiently in English for engineering contexts. In addition, the engineering stakeholders also expected that problem solving skills would be taught in all courses including English. Apart from the EAM, the university was also expected to fulfil the Malaysian Qualifications Framework (MQF) required by the Ministry of Higher Education. This includes the need for students to achieve at least a Band 3 when graduating. In the English Language Department, enhancing students’ mastery of English and developing communication skills were their priority. While the engineering stakeholders were more concerned about engineering graduates’ ability to communicate in English for engineering and problem solving skills, the ministry’s concern was about students passing MUET. As for the EL educators,
they may perceive that the need to focus on improving students’ limited language proficiency was stronger than the need to focus on ESP requirements due to their strong ESL identities.

**8.3.3.2 Managing students’ limited proficiency**

The analysis of the EAM and engineering programme description documents revealed that the requirement for English language performance at entry level was low, meaning that some students enrolled with limited English language proficiency. The analysis of the Communication and Technical Writing courses however, revealed that the content of these courses required students to have sufficient proficiency levels to allow the learning outcomes of these courses to be achieved. With students’ limited proficiency in English, the participants reported tensions in having to improve students’ English language proficiency and teach communication skills in English or teaching problem solving skills.

Mat and Justin, for example, both found that students’ limited proficiency interfered with their communicative abilities and experienced challenges in addressing the learning outcomes which required students to produce language and communicate their ideas in English. In the context of ESP for a specific discipline, ESP educators need to consider not only students’ limited proficiency but also language needs and soft skills relevant for a specific discipline when designing their instructional practices.

**8.3.3.3 A gap between acquisition and application of knowledge and skills**

The study found that the ambiguities in positioning English language teaching had not only diluted the demand for ESP for engineering, but led to the development of an engineering academic curriculum that had limited support in providing effective teaching of ESP courses. The analysis of the engineering academic curriculum revealed that there was a large gap between the period when communication and language skills were taught (in the first two years of their programme) and the requirements for the application of these language skills in their final year (final semester) when they undertook their project. Although students might have had opportunities to apply these communication and language skills during this gap, or when they wrote and presented their final year engineering project, the language that they used during this period may or may not have been English. It was not clearly stated, either in the engineering accreditation manual or in the programme structure of the university, that it was compulsory for students to perform all these tasks in English. Given that the enhancement of communication skills in English during this period may be limited, integration of English and engineering content during the first two years may not be sufficient for students to complete their final year project in English.
Studies conducted in the USA, Finland and Hungary highlighted that the location of the English language courses in the engineering academic curriculum played a significant role in supporting the integration of content and language (Beck, 2004; Dannels, Anson, Bullard, & Peretti, 2003; Lappalainen, 2010). In India, studies were conducted to ascertain the relevance of the approach used and the English language course developed for engineering, and to identify the English language skills for engineering students (Venkatraman & Krishnamurthy, 2008; Venkatraman & Prema, 2007). The findings in the current study highlighted that the structure of the engineering academic curriculum not only led to disconnections between the English language courses and the engineering accreditation criteria but also separated these English language courses from the engineering academic curriculum.

This study, therefore, confirms the importance of the location of English language courses within an engineering academic curriculum, particularly in Malaysia. In the context of ESP fields, aspects of integration of course content across discipline and locations of ESP need to be considered when designing an ESP course or an academic curriculum. One implication of this study is that design of the curriculum should be restructured to support interdisciplinary teaching and learning, particularly in the context of ESP. In addition, design of ESP courses can support integration between language and content, as well as soft skills relevant for a particular discipline.

8.4 Research Question 3: How do EL educators manage the complexities of English language teaching in engineering?

The findings in Chapter 7 (Section 7.1) highlighted that professional agency was the key to moving towards teaching ESP. The analysis generated findings about strategies in exercising agency and factors that contributed to exercising agency for EL educators to shift from being ESL educators to becoming ESP educators.

8.4.1 Strategies in exercising agency

According to Petrovic and Kuntz (2013), there are three strategies in exercising agency which are responding, interpreting and reframing (see Chapter 7 for discussions). In Chapter 7 (Section 7.1), participants demonstrated two of these types which were interpreting and reframing. Mila had reframed English language courses as ESP but in her teaching, she continued to teach about the language as she was concerned about students’ limited proficiency in English. Mat reframed English language courses as ESP, focusing on development of problem solving skills for general contexts. His instructional practices illustrated that he had moved towards becoming an ESP educator. Justin used both interpreting and reframing. For example, he interpreted Academic
English as the course which addressed English language learning and reframed Communication as the course that addressed communicative abilities. Justin’s accounts illustrated that the strategies for exercising agency were interchangeable depending on how he positioned himself within the specific courses that he was teaching.

The findings highlight that the types of agency the participants exercised depended on how they positioned themselves within their institutional context and perceived the goals of English language courses. Evidence of the relationship between agency and how educators position themselves within a context is limited but has been raised (Kayi-Aydar, 2015). The current study highlights the interplay among positioning English language teaching, agency and professional identities and the results provided evidence that there was a continuum from interpreting to reframing in exercising agency, creating iterative cycles among positioning, agency and professional identities that these participants were constantly negotiating. In making meaning of English language teaching, for example, the participants interpreted their institutional contexts in relation to the engineering academic curriculum, the design and content of English language courses and the students’ performance in English language. As they understood their institutional contexts, the participants reframed English language teaching and exercised their agency to negotiate their professional identities which then encouraged them to exercise their agency in their pedagogies and teaching practices.

This finding is relevant for all educators new to teaching ESP as it provides knowledge and understanding about the complexity of positioning English language teaching as ESP, which could enable EL educators to shift from ESL to ESP, especially in Malaysian contexts.

8.4.2 Factors contributing to agency

Exercising agency was found to be dependent on the participants’ own capacities and understanding (internal factors) and the students’ language learning needs (external factors) within the university. This finding supports Priestley et al. (2012) who argued that the extent to which teacher agency can be exercised varies from one context to another, depending on the conditions, constraints and the ways teachers interpret the context in which they work. The findings in this study also support the notion that professional agency is fundamental to the process of negotiating teachers’ beliefs and practices, and making pedagogical decisions about teaching and student learning to shape professional identities (Hao, 2011; Hökkä, Eteläpelto, & Rasku-Puttonen, 2012; Trent, 2010; Tsui, 2007). Jamal, for example, was frustrated when he found that his students could not understand his instructions about completing a given task. He was also frustrated about his inability to teach the language within a limited time.
The findings in this study add to the literature by identifying external factors which impacted on exercising professional agency such as students’ inability to comprehend the given tasks, the limited proficiency and language anxiety of the students, the limited time allocation for English language courses, the locations of the English language courses and the content, as well as the design of the English language courses.

There are also external factors, such as the design of the curriculum, which had a significant role in these participants’ capacities to exercise agency. Mat, for example, did not integrate English and engineering content because the location of the English language courses did not support this integration. This implies that he would exercise agency to create a learning environment which supported the integration between English language and engineering courses if the courses were appropriately located in the programme. In addition, Mat’s agency was exercised to create a teaching and learning environment which supported teaching problem solving through performing tasks where the subject matter involved knowledge about English language, English language skills and communication skills. His knowledge and beliefs about teaching problem solving skills motivated him to provide such a learning environment.

The findings related to the factors that contributed to agency indicated that exercising agency was also affected by internal factors which included the participants’ confidence about going beyond the prescribed knowledge and expertise in ESL teaching. These findings support Hökkä et al. (2012) who argued that beliefs, expertise and experience, and exercising agency are connected to one another. In the current study, the relationships between beliefs, expertise, confidence, management support and curriculum design, and exercising agency were established. Justin was the only participant who reported having some basic engineering knowledge and had confidence integrating this knowledge into the topics or content of the English language courses. He also reported that he gained respect from his engineering students when he demonstrated his knowledge to them. Jamal, on the other hand, reported that he did not integrate English and engineering content. His reluctance to do so was related to his concerns about not being able to control teaching and learning if he included knowledge that was not within his expertise. However, when teaching and learning involved his expertise in English language teaching, he exercised his agency to go beyond the syllabus in relation to how he delivered the content. Given that she was not trained to become an educator during her undergraduate education and had limited teaching experience, Mila was unclear about her role at this university. She perceived that her teaching needed to meet the English Language Department’s expectations. Consequently, her agency was limited to knowledge and content prescribed in the syllabus and module of the course she was teaching at the time.
The findings in the present study extend Priestley et al.’s (2012) notion and Hökkä et al.’s (2012) study about the factors that impact on exercising agency by elaborating strategies that EL educators use to manage these factors and exercise their agency. In addition, the findings challenged the notion that exercising agency could change educators’ beliefs about teaching and reduce authenticity in teaching. Evidence for this could be found in the analysis of Jamal’s interview transcripts where he expressed his frustration about not being able to teach the way he taught at a boarding school. His frustration was developed based on tensions in meeting the demands within the context of this university and his beliefs about providing meaningful learning to the students. His experience provides knowledge and understanding about the complex process of how EL educators who have extensive teaching experience transform their ESL identities that they have established into ESP.

8.5 Limitations of the Study

The study site was one technical university located in an urban area in Malaysia. The English language was not always in use outside of the English language classrooms and was very rare outside the university community. Although the findings have provided an in-depth understanding of the complexities of teaching English within a technical institutional context, generalisability to other educational settings and other locations in Malaysia and beyond may be limited.

Twelve participating EL educators (PELE) were recruited for profiling and this number was less than half of the total number of the EL educators. Thus, the profiling may not represent the full English Language Department at this university. From the 12 PELEs, four PELEs were recruited for the main study to investigate their experience in managing English language teaching in a context where English for Specific Purposes is required at one technical university in Malaysia.

The main aim of this study was to examine the complexities that EL educators encountered and how they managed these complexities of English language teaching in engineering. Thus, the outcomes of teaching English for engineering, teaching problem solving skills and communications skills or the effectiveness of the participants’ instructional practices in teaching problem solving skills and communication skills were not addressed. However, the findings in this study may be useful to those researching and working in similar ESL and disciplinary contexts in other universities.
8.6 Implications for Future Research

This study highlighted that the ambiguities in the requirements of engineering accreditation with regard to English language teaching impacted greatly on the way English language teaching was positioned within the engineering academic curriculum, particularly at the English Language Department. Further investigations on English language teaching within a specific discipline could contribute to our understanding of the dissemination process in other contexts.

The ambiguities in understanding the requirements of the engineering accreditation had also impacted on the ways in which EL educators positioned themselves within their institutional contexts, their agency and their professional identities. Further investigation on the interplay among positioning, agency and professional identities could provide strategies on how ESL educators could shift to becoming ESP educators.

The study found that the English language courses were not designed to address the language discourses for the engineering discipline due to the ambiguities in positioning English language teaching. Further exploration of the impacts of these ambiguities on the design of the English language courses may assist with the development of more integrated English language courses for engineering. The study also found that English language courses were perceived as separate from the engineering curriculum and as having a limited role in addressing the engineering accreditation requirements. Further research on the implications of the design of the engineering academic curriculum can provide a deeper understanding of the complexity of positioning and designing the English language courses and teaching communicative skills for engineering contexts. This type of research has the potential to provide information about the ways in which engineering academic curriculum could be developed to support integration of knowledge and skills between English language and other disciplines so that ESP courses could be developed and ESP teaching could be more meaningful to both educators and students.

Further investigations of teaching problem solving skills in ESP are worth conducting to explore teaching practices that support the development of English language abilities, problem solving and communication skills.

8.7 Implications for Practice

The location of the English language courses in the curriculum, the performance of the engineering students in English language and knowledge about engineering issues or content among the EL educators made teaching ESP for engineering challenging as they struggled to exercise professional agency. A closer integration between English language courses and engineering
education is recommended to support the development of communicative skills in English language for engineering contexts. This study raises the need to restructure the academic curriculum, revisit the design of the English language courses to consider ESP for a specific discipline, and seek alternatives to support interdisciplinary English language teaching.

8.7.1 Shifting from ESL to ESP professionals

This study found that some of the participants struggled to negotiate and develop their professional identities within the context of this university. These challenges influenced their pedagogy and their instructional practices. Therefore, it is important for any university where accreditation is involved to be transparent about the engineering accreditation requirements and provide opportunities for all EL educators to develop themselves into becoming ESP educators to fulfil these requirements.

Engineering industries could assist through identifying means by which their requirements could be more effectively conveyed through the Engineering Accreditation Council (EAC) and disseminated and understood at the English Language Department level. Through these considerations, EL educators would have the opportunity to position English language teaching as ESP for engineering and understand the need to address problem solving and communication skills within the engineering discipline.

8.7.2 Developing English language courses for engineering

The content of the English language courses was general in that it did not specifically address English language discourses used in engineering. A needs analysis for the language needs in various disciplines conducted in collaboration with related industries and faculties may be useful so that ESP courses that address the language needs, academically and professionally, for a specific discipline can be designed and developed.

8.7.3 Creating a community of practice with other technical universities

The complexities of teaching English for a technical context may not only be faced by the EL educators at this university. These complexities may also be faced by other EL educators teaching in similar contexts in other higher institutions, locally or internationally. Creating a community of practice with EL educators from other local or international universities could provide opportunities for these educators to share knowledge and experience with, as well as support each other in their struggle to shift from being ESL educators to ESP educators. This
network would not only benefit the EL educators at this university, but also EL educators in other universities as well.

8.7.4 Restructuring the engineering academic curriculum

The location of the English language courses is one of the factors which hindered the syllabus of the English language courses from being contextualised into a particular engineering discipline. Therefore, a restructuring of the engineering academic curriculum is important to provide opportunities for the English language courses to be linked to engineering courses so that students could relate the knowledge and skills they learn between the two disciplines. In addition, there is a need to reposition English language teaching as ESP at all levels of the dissemination process (the university, the engineering faculties, the curriculum designers, the engineering lecturers, the students and the EL educators themselves).

8.7.5 Creating partnerships

Knowledge of engineering and English language discourse used in engineering were highlighted as contributing factors to teaching English for engineering. Thus, partnerships between EL educators and engineering industries as well as between EL educators and engineering lecturers are important. Forming collaborative partnerships with the engineering industries, knowledge about common communicative events and English language discourse used in engineering could enhance the development and integration of English language courses with engineering requirements. Collaborative teaching could be considered so that EL educators can address the language needs in engineering while engineering educators address the engineering content. The teaching schedule of the engineering and EL educators could be aligned to allow this partnership to be possible. However, the complexity that needs to be considered when managing the partnership involves teaching the content and the language so that neither component is perceived as a separate topic or unit. This means that, in order for such partnerships to work, both parties should understand their roles in the teaching process.

8.8 Conclusion

The main aim of this study was to investigate how EL educators managed the complexities of English language teaching in an engineering university. The findings have provided knowledge about how English language teaching is positioned by the engineering body (requirements), the university, the engineering faculties, curriculum design, and the English Language Department (dissemination), and the EL educators (implementation) in this context. The dissemination process diluted the need for English language teaching to take on the ESP role, causing EL educators to
struggle in conceptualising English language teaching, developing and negotiating their professional identities as well as in their pedagogies. The findings highlight that teaching in a discipline-specific institutional context not only involves understanding what needs to be taught and how to go about teaching it, but also about positioning English language teaching, agency and the development of appropriate professional identities that enable the transformation from ESL educators to ESP educators. The findings also raised the importance of exercising agency in negotiating or transforming ESL educators’ professional identities.

This study has unpacked English language teaching within a specific discipline in a second language tertiary context and broadens our understanding of ways in which EL educators managed the challenges in teaching within this context. The findings add to our knowledge and understanding of how EL educators who had strong identities as ESL educators become ESP educators. This study contributes to the body of literature on agency by providing evidence that positioning, agency and professional identities are linked through iterative cycles. In conclusion, transforming ESL educators into ESP educators is complex, requiring support in various forms and from a number of stakeholders to assist the transformation.
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Appendices

Appendix A: Ethical Clearance Approval

Appendix B: Information Package and Forms

B1: Information sheet – standard information sheet for all the participants;
B2: Letter to Dean of faculty;
B3: Letter to Dean of engineering faculties;
B4: Letter to the participants of the pilot study;
A5: Letter to the ESL educators;
B6: Letter to the participants of the main study;
B7: Letter to the technician;
B8: Consent form for the Dean of the faculty;
B9: Consent form for the Dean of the engineering faculties;
B10: Consent form for the participants of the pilot study;
B11: Consent form for the ESL educators/participants of the main study;
B12: Consent form for the technician.

Appendix C: Instruments

C1: Questionnaire
C2: Interview Pro-Forma
C3: Classroom Observation Sheet
C4: Stimulated Recall Protocols

Appendix D: Code Reference for Data sources
Appendix A: Ethical Clearance Approval

SCHOOL OF EDUCATION

Response to Application for Ethical Clearance

<table>
<thead>
<tr>
<th>Applicant Name:</th>
<th>Mimi Nahariah Azwani Mohamed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Supervisor:</td>
<td>Richard Baldauf</td>
</tr>
<tr>
<td>Applicant email address:</td>
<td><a href="mailto:mimi.mohamed@uqconnect.edu.au">mimi.mohamed@uqconnect.edu.au</a></td>
</tr>
</tbody>
</table>

Participants/Recruitment (Qs 1-3) -
Sufficient information provided.

Project Summary/Research Plan (Qs 4-5)
Excellent.

Ethical Considerations (Qs 6-17)
Clearly articulated ethical considerations.

Consent Form/Information Sheet
Excellent.

Questionnaire
 Appropriately outlined.

Gatekeepers
Plans to seek gatekeeper approval are clearly articulated.

Presentation (correct form, typed, error free)
Excellent.

Comments & Recommendations
Approved. Great application! Good luck with your research.

(Signed) Member of UQSE Research Ethics Committee:
Kim Nichols, member of UQSE Research Ethics Committee
Date. 16th November, 2010
Appendix B1: Information Sheet

This will be issued on the School of Education, University of Queensland letterhead.

Title of the Project:
Managing the Complexities of English Language Teaching in Engineering

I am Ms Mimi Mohamed, a Doctoral candidate at the School of Education, the University of Queensland, Australia. The study is supervised by Professor Richard Baldauf and Associate Professor Karen Moni of the School of Education. The aims of this study are to examine the complexities of English language teaching in engineering, to examine the teaching practices of ESL educators in teaching English for engineering and to examine how the ESL educators manage the complexities of teaching problem solving and communication skills in English. The outcomes of this study contribute to knowledge and understanding of the complexities of English language teaching in engineering and ways in which ESL educators teach problem solving and communication skills in English.

The data collection procedure will be conducted in two phases. In the first phase, I will invite two ESL educators to participate in the pilot study. The purpose of the pilot study is to test the validity of the instruments and the feasibility of the research procedures. The two participants will complete a questionnaire (45 minutes), undergo an individual interview which will be audio-recorded (one hour), their classrooms will be observed and video recorded, will undergo video-recorded stimulated recall protocols (one hour) and a video-recorded focus group (one hour). The stimulated recall, which is conducted individually, is a procedure where the participants will need to give explanations about excerpts from their recent classroom teaching. They will be given training (45 minutes) in using the protocols before the researcher starts with the actual procedures.

As part of the data collection procedures in the first phase, I will also be collecting related documents such as engineering accreditation criteria and procedures, the university policy descriptions on generic skills or graduate attributes, engineering programme descriptions, engineering course descriptions and syllabi, minutes of meeting related to syllabus review, English language course descriptions and syllabi, and examination papers for the English language course.

In the second phase, all the ESL educators are invited to complete the questionnaire. Following this, four participants will be approached to participate in the study. All the four participants will participate in an individual interview followed by the classroom observations, stimulated recall and focus group which will all be conducted three times. The allocation of time for each procedure is as indicated in the first phase.
The data collection process will be minimally disruptive to the participants’ daily routines. Careful planning will be taken so that the data collection procedures are conducted at a time convenient to the participants within their working hours and their teaching and learning activities are not disrupted. All information will be kept under secure conditions. Names of participants and the university will remain anonymous. Participation in the study is voluntary. Participants can withdraw from the study at anytime without prejudice. Data already collected from a participant who withdraws would not be used for the research. A summary of the findings will be provided at the completion of the study.

This study has been cleared in accordance with the ethical review guidelines and processes of The University of Queensland. These guidelines are endorsed by the University's principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. You are free to discuss this study with the principal supervisor of the project (contactable on: 001-617-33656496 or email: r.baldauf@uq.edu.au). If you would like to speak to an officer of the University not involved in the study, you may contact the School Ethics Officer on 001-617-33656502.

Yours faithfully,

Mimi Nahariah Azwani Mohamed  
PhD Student  
School of Education  
Email: mimi.mohamed@uqconnect.edu.au

Prof Richard Baldauf  
Principal Supervisor  
School of Education  
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Associate Professor Karen Moni  
Associate Supervisor  
Tel : 001-617-33656872  
E-mail : k.moni@uq.edu.au
Appendix B2: Letter to the Dean of the Faculty

This will be issued on the School of Education, University of Queensland letterhead.

Name
Title/Position
Address, Date

Dear Sir,

Request for Permission to Conduct a PhD Research Entitled “Exploring the Complexity of Teaching Problem Solving Skills through English Language Teaching”

I write to you as a Doctoral candidate at the School of Education, the University of Queensland, Australia. I am conducting a research entitled Managing the Complexities of English Language Teaching in Engineering. This study is supervised by Professor Richard Baldauf and Associate Professor Karen Moni of the School of Education. The main aim of this study is to examine the complexities of English language teaching in engineering, and how ESL educators managed these complexities. The Information Sheet that further outlines the details of the study is attached.

I would like to request permission and a letter of authorization to recruit the ESL educators as participants and carry out a pilot study and the actual data collection at this faculty. This study will last for five months. Apart from completing a questionnaire, the participants will be involved in, interviews, classroom observations, stimulated recall protocols and focus groups.

As part of the data collection procedures, I will also be collecting related documents such minutes of meeting related to syllabus review for English language courses, English language course descriptions and syllabi, and examination papers for the English language courses.

The data collection process will be minimally disruptive to the participants’ working hours. All information will be kept under secure conditions. Names of participants and the university will remain anonymous. Participation in the study is voluntary. Participants can withdraw from the study at anytime without prejudice. Data already collected from a participant who withdraws would not be used for the research. A summary of the findings will be provided at the completion of the study.
This study has been cleared in accordance with the ethical review guidelines and processes of The University of Queensland. These guidelines are endorsed by the University's principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. You are free to discuss this study with the principal supervisor of the project (contactable on: 001-617-33656496 or email: r.baldauf@uq.edu.au). If you would like to speak to an officer of the University not involved in the study, you may contact the School Ethics Officer on 001-617-33656502.

Yours faithfully,

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Associate Supervisor
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E-mail : k.moni@uq.edu.au
Appendix B3: Letter to the Dean of Engineering Faculties

This will be issued on the School of Education, University of Queensland letterhead.

Name
Title/Position
Address, Date

Dear Sir,

Request for Permission to Collect Documents to Conduct a PhD Research Entitled “Exploring the Complexity of Teaching Problem Solving Skills through English Language Teaching”

I write to you as a Doctoral candidate at the School of Education, the University of Queensland, Australia. I am conducting a research entitled Managing the Complexities of English Language Teaching in Engineering. This study is supervised by Professor Richard Baldauf and Associate Professor Karen Moni of the School of Education. The main aim of this study is to examine the complexities of English language teaching in engineering, and how ESL educators managed these complexities. The Information Sheet that further outlines the details of the study is attached.

I would like to ask for your kind permission to allow me to collect relevant documents for this study. As part of the data collection procedures, I will be collecting documents such descriptions of engineering programme outcomes, the engineering syllabi and course descriptions, the accreditation procedures of engineering programmes and the accreditation criteria related to engineering graduate outcomes.

All information will be kept under secure conditions. Name of this faculty and the university will remain anonymous. A summary of the findings will be provided at the completion of the study.

This study has been cleared in accordance with the ethical review guidelines and processes of The University of Queensland. These guidelines are endorsed by the University's principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. You are free to discuss this study with the principal supervisor of the project (contactable on: 001-617-33656496 or email: r.baldauf@uq.edu.au). If you would like to speak to an officer of the University not involved in the study, you may contact the School Ethics Officer on 001-617-33656502.

Yours faithfully,
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E-mail: k.moni@uq.edu.au
Appendix B4: Letter to the Participants of the Pilot Study

This will be issued on the School of Education, University of Queensland letterhead.

Name  
Title/Position  
Address, Date

Dear Sir/Madam,

I write to you as a Doctoral candidate at the School of Education, the University of Queensland, Australia. I am conducting a research entitled *Managing the Complexities of English Language Teaching in Engineering*. This study is supervised by Professor Richard Baldauf and Associate Professor Karen Moni of the School of Education. The main aim of this study is to examine the complexities of English language teaching in engineering, and how ESL educators managed these complexities. The Information Sheet that further outlines the details of the study is attached.

I would like to request permission to recruit you as a participant in the pilot study. The pilot study will last for 4 weeks. You will be given a questionnaire to complete and will be involved in an individual interview, a classroom observation, a stimulated recall protocol and a focus group. You will be given opportunities to provide feedback on the instruments and the procedures used for the data collection process. Your feedback is valuable to this research as it helps me to make necessary changes on the instruments and the procedures to be used for this study.

The data collection process will be minimally disruptive to your working hours. All information will be kept under secure conditions. Your name and the name of the university will remain anonymous. Participation in the study is voluntary. You can withdraw from the study at anytime without prejudice. Data already collected from you if you withdraw would not be used for the research. A summary of the findings will be provided at the completion of the study.

This study has been cleared in accordance with the ethical review guidelines and processes of The University of Queensland. These guidelines are endorsed by the University's principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. You are free to discuss this study with the principal supervisor of the project (contactable on: 001-617-33656496 or email: r.baldauf@uq.edu.au). If you would like to speak to an officer of the University not involved in the study, you may contact the School Ethics Officer on 001-617-3365 6502.
Yours faithfully,

Mimi Nahariah Azwani Mohamed  
PhD Student  
School of Education  
Email: mimi.mohamed@uqconnect.edu.au

Prof Richard Baldauf  
Principal Supervisor  
School of Education  
Tel : 001-617-33656496  
E-mail : r.baldauf@uq.edu.au

Associate Professor Karen Moni  
Associate Supervisor  
Tel : 001-617-33656872  
E-mail : k.moni@uq.edu.au
Appendix B5: Letter to the ESL Educators

This will be issued on the School of Education, University of Queensland letterhead.

Name
Title/Position
Address, Date

Dear Sir/Madam,

I write to you as a Doctoral candidate at the School of Education, the University of Queensland, Australia. I am conducting a research entitled Managing the Complexities of English Language Teaching in Engineering. This study is supervised by Professor Richard Baldauf and Associate Professor Karen Moni of the School of Education. The aim of this study is to examine the complexities of English language teaching in engineering, and how ESL educators managed these complexities. The Information Sheet that further outlines the details of the study is attached.

I would like to request that you participate in this study by completing the questionnaire enclosed. The questionnaire will take about 30 minutes to complete. This questionnaire contains items which could provide a brief understanding of the perceptions and knowledge as well as teaching practices and experiences in teaching problem solving skills through English language teaching to engineering students.

As part of the data collection process, you are requested to write your name on the questionnaire. However, I assure you that all information will be kept under secure conditions. Your name and the name of the university will remain anonymous. Participation in the study is voluntary. You can withdraw from the study at anytime without prejudice. Data already collected from you if you withdraw would not be used for the research. A summary of the findings will be provided at the completion of the study.

This study has been cleared in accordance with the ethical review guidelines and processes of The University of Queensland. These guidelines are endorsed by the University’s principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. You are free to discuss this study with the principal supervisor of the project (contactable on: 001-617-33656496 or email: r.baldauf@uq.edu.au). If you would like to speak to an officer of the University not involved in the study, you may contact the School Ethics Officer on 001-617-3365 6502.
Yours faithfully.

Mimi Naharia Azwani Mohamed  
PhD Student  
School of Education  
Email: mimi.mohamed@uqconnect.edu.au

Prof Richard Baldauf  
Principal Supervisor  
School of Education  
Tel : 001-617-33656496  
E-mail : r.baldauf@uq.edu.au

Associate Professor Karen Moni  
Associate Supervisor  
Tel : 001-617-33656872  
E-mail : k.moni@uq.edu.au
Appendix B6: Letter to the Participants of the Main Study

This will be issued on the School of Education, University of Queensland letterhead.

Name
Title/Position
Address, Date

Dear Sir/Madam,

I write to you as a Doctoral candidate at the School of Education, the University of Queensland, Australia. I am conducting a research entitled Managing the Complexities of English Language Teaching in Engineering. This study is supervised by Professor Richard Baldauf and Associate Professor Karen Moni of the School of Education. The aim of this study is to examine the complexities of English language teaching in engineering, and how ESL educators managed these complexities. The Information Sheet that further outlines the details of the study is attached.

I would like to request for permission to recruit you as a participant of this study. This study will last for three months. You will be involved in an individual interview which will only be conducted once and will take about an hour. You will also be involved in classroom observations, stimulated recall protocols (an hour) and focus groups (an hour) which will be conducted three times each. You will be given training on the stimulated recall protocols for 45 minutes prior to the actual procedures. The individual interview will be audio-recorded and the classroom observations, the stimulated recall protocols and the focus groups will be video recorded with the assistance of a technician.

The data collection process will be minimally disruptive to your working hours. All information will be kept under secure conditions. Your name and the name of the university will remain anonymous. Necessary steps will be taken to ensure the information gathered during the focus group and with the presence of the technician are protected and are treated with confidentiality. Participation in the study is voluntary. You can withdraw from the study at anytime without prejudice. Data already collected from you if you withdraw would not be used for the research. A summary of the findings will be provided at the completion of the study.

This study has been cleared in accordance with the ethical review guidelines and processes of The University of Queensland. These guidelines are endorsed by the University's principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. You are
free to discuss this study with the principal supervisor of the project (contactable on: 001-617-33656496 or email: r.baldauf@uq.edu.au). If you would like to speak to an officer of the University not involved in the study, you may contact the School Ethics Officer on 001-617-33656502.

Yours faithfully,

Mimi Nahariah Azwani Mohamed
PhD Student
School of Education
Email: mimi.mohamed@uqconnect.edu.au

Prof Richard Baldauf
Principal Supervisor
School of Education
Tel : 001-617-33656496
E-mail : r.baldauf@uq.edu.au

Associate Professor Karen Moni
Associate Supervisor
Tel : 001-617-33656872
E-mail : k.moni@uq.edu.au
Appendix B7: Letter to the Technician

This will be issued on the School of Education, University of Queensland letterhead.

Name
Title/Position
Address, Date

Dear Sir,

I write to you as a Doctoral candidate at the School of Education, the University of Queensland, Australia. I am conducting a research entitled Managing the Complexities of English Language Teaching in Engineering. This study is supervised by Professor Richard Baldauf and Associate Professor Karen Moni of the School of Education. The main aim of this study is to explore the complexity of and how English language educators manage the process of teaching problem solving skills to engineering students through English language teaching. The Information Sheet that further outlines the details of the study is attached.

I would like to request for permission to recruit you as my technical assistance in this study. This study will last for five months. You will be involved in operating a video camera to video record classroom observations and setting up the video camera to automatically record the interviews, the stimulated recall protocols and the focus groups.

The data collection process will be minimally disruptive to your working hours. All information will be kept under secure conditions. Your name and the name of the university will remain anonymous. Participation in the study is voluntary. You can withdraw from providing technical assistance for this study at any time without prejudice.

This study has been cleared in accordance with the ethical review guidelines and processes of The University of Queensland. These guidelines are endorsed by the University's principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. You are free to discuss this study with the principal supervisor of the project (contactable on: 001-617-33656496 or email: r.baldauf@uq.edu.au). If you would like to speak to an officer of the University not involved in the study, you may contact the School Ethics Officer on 001-617-3365 6502.
Yours faithfully,

Mimi Nahariah Azwani Mohamed  
PhD Student  
School of Education  
Email: mimi.mohamed@uqconnect.edu.au

Prof Richard Baldauf  
Principal Supervisor  
School of Education  
Tel  : 001-617-33656496  
E-mail: r.baldauf@uq.edu.au

Associate Professor Karen Moni  
Associate Supervisor  
Tel  : 001-617-33656872  
E-mail: k.moni@uq.edu.au
Appendix B8: Consent Form for the Dean of the Faculty

This will be issued on the School of Education, University of Queensland letterhead.

I have read the information sheet and the letter which are attached to this form on the study entitled Managing the Complexities of English Language Teaching in Engineering being conducted by Ms. Mimi Nahariah Azwani Mohamed, a PhD student of the School of Education, The University of Queensland, Australia.

I have been given and have understood an explanation about this study. I have had an opportunity to ask questions and have them answered to my satisfaction. I understand that the aims of this study are to examine the complexities of English language teaching in engineering, to examine the teaching practices of ESL educators in teaching English for engineering and to examine how the ESL educators manage the complexities of teaching problem solving and communication skills in English.

I understand that this study requests that all the English language educators from the English language department of this faculty complete a questionnaire.

I understand that two English language educators will be invited to take part in the pilot study and six will be invited to take part in the actual study.

I understand that the pilot study will last for four weeks while the actual study will last for three months.

I have been assured that the data collection process will be minimally disruptive to the working hours of the English language educators who are involved.

I have been assured that all information will be kept under secure conditions and the name of the English language educators, the faculty and the university will remain anonymous.

I understand that I can withdraw my consent at any time without prejudice.

I understand that this study has been cleared in accordance with the ethical review guidelines and processes of the University of Queensland. These guidelines are endorsed by the University’s principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the
National Statement. I am free to discuss this study with the principal supervisor of the project (contactable on 001-617-33656496 or email: r.baldauf@uq.edu.au) or I may contact the School Ethics Officer on 001-617-33656502.

I hereby give my consent to authorise this research be conducted at this faculty.

Name (In print)…………………………………………………………………………………………………………………………

Signature:…………………………………………………………………………………………………………………………

Date:…………………………………………………………………………………………………………………………
Appendix B9: Consent Form for the Dean of Engineering Faculties

This will be issued on the School of Education, University of Queensland letterhead.

I have read the information sheet and the letter which are attached to this form on the study entitled Managing the Complexities of English Language Teaching in Engineering being conducted by Ms. Mimi Nahariah Azwani Mohamed, a PhD student of the School of Education, The University of Queensland, Australia.

I have been given and have understood an explanation about this study. I have had an opportunity to ask questions and have them answered to my satisfaction. I understand that the aims of this study are to examine the complexities of English language teaching in engineering, to examine the teaching practices of ESL educators in teaching English for engineering and to examine how the ESL educators manage the complexities of teaching problem solving and communication skills in English.

I understand this study asks to obtain documents such descriptions of engineering programme outcomes, the engineering syllabi and course descriptions, the accreditation procedures of engineering programmes and the accreditation criteria related to engineering graduate outcomes.

I have been assured that all information will be kept under secure conditions and the name of the faculty and the university will remain anonymous.

I understand that I can withdraw my consent at any time without prejudice

I understand that this study has been cleared in accordance with the ethical review guidelines and processes of the University of Queensland. These guidelines are endorsed by the University’s principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. I am free to discuss this study with the principal supervisor of the project (contactable on 001-617-33656496 or email: r.baldauf@uq.edu.au) or I may contact the School Ethics Officer on 001-617-33656502.

I hereby give my consent to authorise this research be conducted at this faculty.

Name (In print): ………………………………………………………………………………………………………

Signature: ………………………………………………………………………………………………………

Date: ………………………………………………………………………………………………………
Appendix B10: Consent Form for the Participants of the Pilot Study

This will be issued on the School of Education, University of Queensland letterhead.

I have read the information sheet and the letter which are attached to this form on the study entitled Managing the Complexities of English Language Teaching in Engineering being conducted by Ms. Mimi Nahariah Azwani Mohamed, a PhD student of the School of Education, The University of Queensland, Australia.

The aims of this study are to examine the complexities of English language teaching in engineering, to examine the teaching practices of ESL educators in teaching English for engineering and to examine how the ESL educators manage the complexities of teaching problem solving and communication skills in English.

I have been given and have understood an explanation about this study and have had an opportunity to ask questions and have them answered to my satisfaction.

I am willing to provide the information required in the questionnaire and feedback on the items in the questionnaire.

I understand that I will take part in an individual interview which will take about an hour and will be audio-recorded.

I understand that my teaching will be observed once and will be video-recorded by a technical assistance.

I understand that I will take part in stimulated recall protocols and the procedures have been clearly explained to me.

I understand that the stimulated recall protocols will take about an hour and will be video-recorded.

I understand that I will be involved in a focus group once for an hour and the discussion will be video-recorded.

I understand that any information which I provide will be kept confidential.
I understand that I can withdraw my consent at any time without prejudice and data already collected from me would not be used for the research.

I understand that this study has been cleared in accordance with the ethical review guidelines and processes of the University of Queensland. These guidelines are endorsed by the University’s principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. I am free to discuss this study with the principal supervisor of the project (contactable on 001-617-33656496 or email: r.baldauf@uq.edu.au) or I may contact the School Ethics Officer on 001-617-33656502.

I hereby give my consent to participate in this research.

Name (In print): ……………………………………………………………………………………………...
Signature: ………………………………………………………………………………………………
Date: ………………………………………………………………………………………………………
Appendix B11: Consent Form for ESL Educators/Participants of the Main Study

This will be issued on the School of Education, University of Queensland letterhead.

I have read the information sheet and the letter which are attached to this form on the study entitled Managing the Complexities of English Language Teaching in Engineering being conducted by Ms. Mimi Nahariah Azwani Mohamed, a PhD student of the School of Education, The University of Queensland, Australia.

The aims of this study are to examine the complexities of English language teaching in engineering, to examine the teaching practices of ESL educators in teaching English for engineering and to examine how the ESL educators manage the complexities of teaching problem solving and communication skills in English.

I have read the information sheet and the letter which are attached to this form. I have been given and have understood an explanation about this study. I have had an opportunity to ask questions and have them answered to my satisfaction.

I am willing to provide the information required in the questionnaire. Upon completing and returning the questionnaire, I understand that:

I may need to take part in an individual interview which may be audio-recorded.

My teaching may be observed three times and may be video-recorded.

I may need to take part in stimulated recall protocols for three times and the procedures have been clearly explained to me.

The stimulated recall sessions will be video-recorded.

I may need to take part in focus group discussions for three times and the discussions will be video-recorded.

Any information I provided will be kept confidential.

I understand that I can withdraw my consent at any time without prejudice and data already collected from me would not be used for the research.

I understand that this study has been cleared in accordance with the ethical review guidelines and processes of the University of Queensland. These guidelines are endorsed by the University’s principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the
National Statement. I am free to discuss this study with the principal supervisor of the project (contactable on 001-617-33656496 or email: r.baldauf@uq.edu.au) or I may contact the School Ethics Officer on 001-617-33656502.

I hereby give my consent to participate in this research.

Name (In print): .......................................................... .......................................................... .......................................................... ..........................................................

Signature: ........................................................................................................................................

Date: ........................................................................................................................................
Appendix B12: Consent Form for the Technician

This will be issued on the School of Education, University of Queensland letterhead.

I am willing to assist in operating the video camera in the data collection procedures for the study Managing the Complexities of English Language Teaching in Engineering being conducted by Ms. Mimi Nahariah Azwani Mohamed, a PhD student of the School of Education, The University of Queensland, Australia.

The aims of this study are to examine the complexities of English language teaching in engineering, to examine the teaching practices of ESL educators in teaching English for engineering and to examine how the ESL educators manage the complexities of teaching problem solving and communication skills in English.

I have read the information sheet and the letter which are attached to this form. I have been given and have understood an explanation about this study and what I am expected to record. I have had an opportunity to ask questions and have them answered to my satisfaction.

I understand that I can withdraw from providing technical assistance for this study at any time without prejudice.

I understand that this study has been cleared in accordance with the ethical review guidelines and processes of the University of Queensland. These guidelines are endorsed by the University’s principal human ethics committee, the Human Experimentation Ethical Review Committee, and registered with the Australian Health Ethics Committee as complying with the National Statement. I am free to discuss this study with the principal supervisor of the project (contactable on 001-617-33656496 or email: r.baldauf@uq.edu.au) or I may contact the School Ethics Officer on 001-617-33656502.

I hereby give my consent to participate in this research.

Name (In print): ……………………………………………………………………………………………………………………………….

Signature: ……………………………………………………………………………………………………………………………………

Date: ………………………………………………………………………………………………………………………………………
Appendix C1: Questionnaire

Introduction

The main aim of this study is to examine the complexities of English language teaching in engineering and how the ESL educators manage the complexities of teaching problem solving and communication skills in English. The information gained from this questionnaire will be confidential and your name will not be disclosed. Your cooperation in providing transparent information is highly appreciated. This questionnaire is divided into three sections. Please complete all sections.

Section A

1. Gender: ......................

2. Qualification: a) .................................................................................................................. 

b) .................................................................................................................. 

c) ..................................................................................................................

3. Duration of teaching English: a) in higher institutions : ............... 

b) in secondary schools : ................. 

c) in primary schools : .....................

4. Duration of teaching English in this university: ....................

5. Courses taught this semester (Please indicate DE for degree and DP for diploma. Indicate also the faculty of the students for the courses you teach i.e. FKEE, FKMP, FKAAS, FPT, FPTek): 

a) ............................................................................................................................. 

b) ............................................................................................................................. 

c) ............................................................................................................................. 

6. The number of courses or trainings enrolled for professional development in relation to teaching English throughout your teaching career (if any): ................................................ 

(Write the name of the courses below. Write the name of the courses on the last page if more than 3)

a) ............................................................................................................................. 

b) ............................................................................................................................. 

c) .............................................................................................................................

Please Turn Over
Section B

For each of the following statement, circle the number which best describe your opinion about teaching English in higher education. There are no right or wrong answers to these statements.

1. Strongly disagree (STD) 3. Slightly Agree (SLA)
2. Slightly Disagree (SLD) 4. Strongly Agree (STA)

<table>
<thead>
<tr>
<th>Readiness to Teach English in Higher Institutions</th>
<th>STD</th>
<th>SLD</th>
<th>SLA</th>
<th>STA</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. My undergraduate education has provided me with a strong foundation to teach English in higher institutions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. My undergraduate training has adequately prepared me to teach English for a specific discipline.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. My experiences as an ESL educator have provided me with the knowledge and skills to teach English for a specific discipline.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Understanding Beliefs about Teaching English</th>
<th>STD</th>
<th>SLD</th>
<th>SLA</th>
<th>STA</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. ESL educators should teach grammatical knowledge as students need to understand grammatical rules in order to become fluent in the language.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. ESL educators should encourage language production by their students.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. ESL educators should correct students’ errors in their language production either in oral or in written form although the message conveyed could be understood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. ESL educators should have full control of what students need to do and achieve and the knowledge that students should learn.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Developing ESL Courses</th>
<th>STD</th>
<th>SLD</th>
<th>SLA</th>
<th>STA</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. The English language course should be designed based on what English language educators perceive students need to learn to enable them to use the language within a particular discipline.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15. The English language course should be designed based on what students perceive they need to learn to enable them to use the language within a particular discipline</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16. The English language course should be designed based on what the faculties from other disciplines perceive students need to learn to enable them to use the language within a particular discipline.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

*Please Turn Over*
Section C

For each of the following statement, circle the appropriate number to describe your teaching practices.

1. Seldom (SL)  2. Sometimes (SM)  3. Mostly (M)  4. Always (A)

<table>
<thead>
<tr>
<th>Supports and Resources for English Language Teaching in Engineering</th>
<th>SL</th>
<th>SM</th>
<th>M</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. I determine the knowledge about English my students have before I teach them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. The English Language Department provides me with guidelines on how I need to teach engineering students.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. My colleagues from engineering faculties assist me in my teaching when I need assistance in teaching engineering students.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. The engineering faculties have provided the knowledge about English language needs in engineering.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. The engineering faculties provided me with learning outcomes that engineering students need to achieve.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22. I receive information about the criteria and process of accreditation for engineering programmes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Practices in Teaching Problem Solving Skills</th>
<th>SL</th>
<th>SM</th>
<th>M</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. I teach problem solving to help students improve their proficiency in English.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. I teach problem solving as a separate topic in the English language course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25. I concentrate on the English language when I teach problem solving skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26. I teach problem solving process or strategies to help the students to find answers to the problem solving questions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27. I encourage the students to use their own strategies when finding answers to the problem solving questions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28. I teach problem solving to develop students’ problem solving skills which they can also apply to their engineering discipline.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>29. I use problem solving questions which are not related to engineering.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Thank you for completing this questionnaire
Appendix C2: Interview Proforma

Thank you for agreeing to talk to me. I have some general questions I’d like to ask you about your experiences in teaching English and then I am going to focus on teaching English to engineering students and teaching problem solving skills to engineering students. Do you have any questions you would like to ask before we start?

1. How did you become an English language educator?
2. How long have you been teaching?
   - Would there be any changes from when you first start teaching until now?
   - How would you describe these changes?
   - What causes these changes?
3. How did you learn English?
   - How often do you use English outside the classroom?
   - How do you improve your English?
4. What do you think about teaching English in a university?
5. How do you perceive your role as an English language educator?
6. What are the important things for students to acquire in learning English?
   - What about communication?
   - So which is your main focus when you teach English?
7. Tell me about your experiences of teaching English to engineering student
   - How do you teach English to engineering students?
   - Are there any differences between teaching engineering students and students from other disciplines?
   - Are there any similarities?
   - What are some of the strategies that you use?
   - Why do you use them?
   - What knowledge do you think you need to teach English to engineering students?
   - How have you learned about teaching English to engineering students?
8. How do you decide what to teach in your class?
   - Is it based on what you think students should know?
   - Or based of what they think they need?
   - Or based on what engineering faculties want you teach?
   - Or something else?
9. How much do you know about students’ proficiency levels?
   - How do you obtain knowledge about students’ proficiency in English?
   - In what way does students’ proficiency in English influence your instructions and explanations?
   - In what way does it influence the choice and preparation of the teaching materials?
10. Do you have any experience of teaching problem solving skills to engineering students? One of the skills that you need to teach engineering students is the problem solving skills.
   - What do you think about teaching problem solving skills?
• What do you know about teaching problem solving skills to engineering students?
• How do you obtain knowledge you might need to teach problem solving skills to engineering students?
• In what way does students’ English language proficiency influence the tasks that you use for problem solving activities and the way you teach problem solving skills to engineering students?

11. How do you teach problem solving skills to engineering students?
• What about the teaching materials and the assignments? In what context are they based on?
  - Engineering?
  - General?
  - Or others?

12. What do you do well in teaching problem solving skills to engineering students in your English language class?
• What would you like to do better?
• What do you need more help with?
  - Knowledge?
  - Pedagogy?
  - Resources?

13. What resources do you use?
• Would materials you use or activities you conduct be different for students of other disciplines compared to teaching engineering students?
• Would you consider using materials from engineering contexts?

14. What are the external factors which influence the way you teach problem solving skills to engineering students?
• Workload?
• Accreditation?
• Management
Appendix C3: Classroom Observation Sheet

Teaching Problem Solving and Communication Skills in English Language Classrooms

Participant’s Name:

Time:

Class/Section:

Observation Cycle No:

<table>
<thead>
<tr>
<th>Time Stamp (Time spent for the focus)</th>
<th>Teaching Content (Problem Solving, Communication, English Language)</th>
<th>Teaching Practices / Classroom Interactions</th>
<th>Students’ Attitude / Values (e.g: on the use English during interactions)</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

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Appendix C4: Stimulated Recall Protocols

The purpose of this activity is for me to learn about what you are thinking when you are teaching in your class. I heard what you said and saw what you did during the class, but I don’t know what you were thinking when you were teaching. So, I would like you to tell me what was on your mind when you were teaching and why did you decide to make changes when you were teaching.

To help you remember your thoughts during the lesson, what we are going to do now is to review the video recording of your teaching. I have selected the parts that I would like to discuss with you and will go through each part one at a time. After viewing each part, I am going to stop the video player and ask you to talk about what was happening and what you were thinking at that time. Please feel free to replay each part if you are not sure what was happening from the first view. Please remember that I am not here to evaluate your teaching. Just relax. If you are ready we will begin now.

Probes on potential issues that need to be explored:

1. Could you talk about what is happening in this part of the video?
   - Why did you do the way you did?
   - How would you know that your students understood you?

2. Could you explain what you were thinking of doing here?
   - Why were you thinking of doing that?
   - Is that what you have intended to do?
   - What made you do what you did?

3. Why are the activities conducted in such a way?
   - What were you emphasising in this excerpt? Language? Or the process of problem solving?

4. What role were you playing during this activity?
   - Will that be the same for all of your classes?
   - Will that only be when you teach problem solving skills?

5. What were you thinking when students responded in such a way in this excerpt?
### Appendix D: Code Reference for Data Sources

<table>
<thead>
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<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>Int</td>
<td>Interview</td>
</tr>
<tr>
<td>SRP</td>
<td>Stimulated Recall Protocols</td>
</tr>
<tr>
<td>PSR</td>
<td>Pilot Study Respondent</td>
</tr>
<tr>
<td>VR</td>
<td>Video Recording</td>
</tr>
<tr>
<td>T</td>
<td>Transcript</td>
</tr>
<tr>
<td>L</td>
<td>Line</td>
</tr>
</tbody>
</table>

**Note:** Each participant is given a pseudonym. The data are coded as follows:

- **a. Data from interview:**
  
  JamalIntT6L184-187

- **b. Data from video clips:**
  
  JustinVR1T27

- **c. Data from stimulated recall protocols**
  
  MatSRP1T7