CHAPTER FIVE

SUMMARY OF FINDINGS, IMPLICATIONS AND CONCLUSIONS

5.1 Introduction

In this final chapter, all the elements that constituted this study will be examined holistically in an endeavour to enable them to engender an understanding of the experience of first-year Engineering students, in their content-area classroom. The chapter will open with a presentation of a summary of the findings, and then lead on to a discussion of their implications, with special reference to how an ESP programme could work at Unitec. Finally, some suggestions for further research are proffered.

5.2 Summary of the Findings

In the section that follows, a summary of the findings will be discussed under the main themes that emerged from the study, and will cover: the students’ background; the content-area classroom; the academic task; reading; and, writing.

5.2.1 The Students’ Backgrounds

For the purposes of this study, the students were arbitrarily divided into two groups, based on the scores they obtained in the TOEFL examination. Those in the Low Group were those with scores ranging from 550 to 590 points; those in the High
Group, having scores of 591 to 667 points. The 550-point cut-off mark had been determined by the universities with which Uniten carried out its twinning programme. This mark represented the minimum level for entry into the programmes, and was felt to be representative of the minimum level of proficiency required to be able to function in an all-English medium of instruction.

Hence, all students in the study had a minimum level of proficiency in English. The findings showed that those in the High Group used English more, both outside the classroom and at home, while those in the Low Group used either Bahasa Malaysia or another Malaysian language more.

The students’ own perception of their abilities in the four skills (listening, speaking, reading and writing) reflected their scores in the TOEFL examination. Those in the High Group rated themselves better in all the four skills, while those in the Low Group perceived that they were good-to-average, and that they would like to be better in all the four skills.

5.2.2 The Content-Area Classroom

All classes were conducted exclusively in English, both the Physics and Chemistry lecturers being American. Lessons had a lecture-type format, with the lecturer detailing concepts at the head of the class, and generally occupied with working out mathematical problems on the board.
It was noted that there was minimal student participation in the classroom. Students were observed to be passive, seldom responding even when questions were put to them. The lecturers had to resort to eye contact, the reading of body language and other clues, to gauge student comprehension at particular stages in a lesson.

Despite their passivity, students did not seem to face any difficulties in following the lessons. They were noted to be attentive, sometimes taking notes, and generally appearing to be able to cope with what was unfolding in the classroom.

A few students would ask questions when in doubt, but the majority did not do so. Some preferred to meet with their lecturers after class to inquire about areas in which there was doubt. These after-class questions, and the content of their written homework, again provided more information to their lecturers in their attempt to gauge students’ ability to comprehend a lesson. Consequently, the lecturers would then re-teach areas in which students expressed doubt or confusion.

A significant finding was that most of the lessons were in what this researcher has termed the ‘language of mathematics’: formulas, equations, calculations. These strings of numbers carried meaning for both student and lecturer, and represented concepts, explanations, and reasons for topics and ideas that were being studied. They represented a common ground on which student and lecturer met, and provided the foundations and scaffolding on which more knowledge was acquired by the students via the lecturer.
5.2.3 The Academic Tasks

The findings revealed that the main task before the student was the solving of ‘problems’. These involved questions which were formulated to test a student’s understanding of a concept.

These problems were worked out in numbers – the numbers revealing a student’s understanding of the concept, and the formulas he calls into play to solve the problem reveal his thinking skills and reasoning powers. Solutions can involve a single line of numbers, or carry through to a couple of pages or more of calculations.

In order to ‘solve’ these problems, there are other tasks that then come into play. The student needs to be attentive in class, as this is where the lecturer introduces a topic and new concepts. He then needs to read up on the topic (his source: the textbook), and understand the concepts and information he reads. He has to work on as many problems as he can so that he is familiar with how concepts work, and is able to convey his understanding to the lecturer via his homework or in the tests.

The academic tasks before the first-year Engineering student, therefore, involves all the four skills of listening, speaking, reading and writing. However, there is a minimal requirement of writing as it is understood in the ESL classroom. Only occasionally was it observed that students were required to explain a concept or procedure, or to give reasons for why some phenomenon was true or false. Most of the work they were required to do involved numbers, not words.
5.2.4 Reading

This section will recap the findings on what students read to accomplish their academic tasks, what strategies are employed while reading, reasons why students read, and, what problems are encountered in the reading.

5.2.4.1 Materials Read

Almost all the students confessed to only reading the textbook prescribed for each course. Upon examination, it was found that this textbook was a fount of mathematical detail – formulas, equations, the working out of problems (calculations) that needed to be solved. It was also visually stimulating, in that it was filled with graphs, pictures, diagrams, charts, flow charts, and tables, and these made up a sizeable portion of what needed to be digested by the reader.

This then was what the students read, and for most students, this textbook was read to the exclusion of all other textbooks or material. The reasons offered by students as to why they kept to one source of information included the constraints of time, and the fact that there were no questions from other sources of information in the examinations.

Both Specialist Informants concurred that students needed to read more widely. However, they too accepted the reason of time constraints as what prevented students from doing this. Again, they concurred that their examination questions only covered material found in the prescribed textbook, even when another source of information
had been recommended to the students. Hence, the impetus to read more widely did not come from the lecturers, and the one-book-will-suffice system prevailed.

However, both lecturers agreed that this system would not serve the students well as they moved into the higher levels of study at the faculty. As they progressed, they would need to read both extensively and critically to succeed.

5.2.4.2 Students’ Reading Strategies

Generally, students read after they had attended class, and thus benefited from the explanation on the topic provided by the lecturer. The points he stressed and deemed important were noted by the students and these then guided their reading. Calculations performed on the board by the lecturer were deemed crucial to understanding the topic, and these calculations were jotted down in margins of the textbook or in notebooks – to be re-read and re-worked until students were satisfied that they were clear on what they entailed.

Among the reading strategies employed by the students, in both the High and Low groups, included the scanning of chapters for important points that students then either underlined or highlighted. A comparable number of students in both groups used the ‘Contents’ section of the book to identify main areas in the chapter before beginning to read. They would then read the chapter once, highlighting main points as they read. Most students admitted that the chapter would not be read again. Before an examination, or when they needed clarification when solving a problem, only the highlighted portions would be re-read.
There was little use of the dictionary, except by some students in the Low Group. It was generally felt that problems with the meanings of words were not an issue. The more important issue was deemed to be the meaning of concepts, and these needed to be understood clearly.

5.2.4.3 Why Students Read

Most students in both groups deemed reading and important activity for both the Physics and Chemistry courses, and that they would not be able to get through the course without reading.

Both Specialist Informants concurred with the students as they felt that it was possible to cover only a limited amount of material during each class. The student was responsible for discovering the rest through reading on his own. Both Specialist Informants revealed that they would include material, not covered in class, in the examinations that they set. Aware of this, students read up on their own to keep abreast with what was happening in class, and to be able to answer the questions that would appear in an exam.

One factor that motivated students to read was the fact that it was felt that the text held the key to the solutions of the calculations that were deemed so important by the students. Hence, students read their text to discover how to work their calculations. This need to fully understand how their calculations worked was a strong motivating force that helped students persevere with their reading even when they encountered problems with comprehension.
All student informants revealed that they needed to read if they wished to do well in the exams. This also motivated them to read. A good percentage of students in both groups felt it necessary to read, not only to do well in the exams, but also, to be able to follow the course.

5.2.4.4 Students’ Reading Problems

Most students in the High Group did not feel that they encountered any problems with reading. In contrast, many in the Low Group were of the opinion that they did.

One problem encountered was the problem of the text itself. Students in the Low Group felt that that the paragraphs found in the textbook were too long and that the writer took too long to make his point. These two characteristics of the text slowed down their reading and made it difficult for them to maintain concentration while reading, and made for inefficient reading.

For the most part, problems involved calculations – not with reading per se. The working out of problems, the calculations that made up the solution, was deemed most important to the students, surpassing understanding the text (that is, the portion of the text presented in words). And, the text was read in order to mine it for the key it held to the solutions of their calculation problems. Problems encountered when reading these portions of the text were then dealt with, with the ultimate aim of understanding the calculations.
Hence, both groups maintained that when they occasionally found these portions of the text confusing, they would endeavour to seek ways to understand what the text contained. Both groups tackled this problem in the same way: they would re-read the confusing portion until it became clear, enabling them to fathom what was being said. Alternatively, they would ask for help from a friend, or for some, from the subject lecturer.

However, both groups did not seem to find the fact that the text was presented in English to be a problem. It would appear that the background knowledge attained at the SPM level, and the schema activated by the lecturer in class, both helped students to comprehend what they read.

Some students in the Low Group felt that understanding vocabulary was one problem that they faced. However, none of the students in the High Group saw vocabulary encountered in the text as a problem.

A good portion of the students felt that they had problems with speed – that they read too slowly, and would like to be able to read faster as this would enable them to cover more ground in less time.

Again, many of the students felt that they needed to learn how to make better notes, both for when reading and during class lectures. Scientific knowledge is cumulative: what was explained in an earlier part of the lesson was then taken as understood, and the concept used again without explanation in a later part of the lesson, or on another day. Students thus felt that they need better control over their note-taking so they
would have coherent notes to refer to while reading later, or when studying for an exam.

5.2.5 Writing

In this section, a summary of how students write, and their writing problems will be presented.

5.2.5.1 How Students Write

To discover how students write, the views of the Specialist Informants were sought, and triangulated against the written documents produced by the students themselves. The main factors deemed necessary for a successful piece of work were discussed and are outlined below.

One of the main concepts that students need to understand is the concept of ‘audience’. Despite the fact that he is writing for his lecturer, who should be familiar with everything the student is writing about, the student has to understand that his writing needs to be clear, explaining in detail as he goes along.

For example, when explaining a procedure, every step in the process needs to be detailed. New concepts or terms introduced into the explanation need to be explained. Nothing can be taken as ‘understood’ by the reader.
Again, if demonstrating a procedure, clear markers (for example: then, next, etc.) need to be included to enable the reader to follow how the process should be carried out, that is, the steps that need to be undertaken, and in what order.

Students also need to demonstrate, in their writing, the fact that they have read up in the area being tested or questioned. Hence, student writing should not only show that he understands the topic or concept, but that he is knowledgeable in the area and that he is familiar with the reading in the area too.

Both Specialist Informants revealed that they gave students credit for less-than-perfect work if they felt that there was evidence of reading in the written work. Students were given credit for information provided in their writing that had not been covered in class, and had therefore been gleaned from another source.

Students’ work needed to be clearly and logically presented. Grammatically correct work was not deemed necessary as long as it did not mar the message meant to be conveyed.

Nevertheless, despite the above, sometimes numbers spoke better than words. It was felt that a formula or an equation carries with it a wealth of meaning, and where applied appropriately, this numerical answer was accepted in lieu of a written statement.
5.2.5.2 Students' Writing Problems

One of the main problems facing students was the problem of 'audience'. They did not seem to be able to come to terms with the fact that even though they were writing for their lecturer, they still needed to include details, definitions and explanations in their writing.

As a consequence of this problem, many students did not explain sufficiently. Laws quoted and terms introduced were neither defined nor explained. Hence, students were not able to convey to the lecturer the fact that they understood what they (the students) were writing about.

Another problem faced by many students was that they were not able to write in a clear, organized and logical manner. Convoluted reasoning and poor organization of ideas were thus unable to demonstrate the students' understanding and knowledge to the lecturer, and consequently, students were not able to obtain the full marks for such pieces of work.

Again, many students were not able to show, via their written work, the knowledge they had gleaned from their reading. Information provided in their writing was often found to be general in nature, lacking specifics that could show the lecturer that the students had read up on the topic. Students were then penalized for not being sufficiently informed in the said area.
Generally, both Specialist Informants concurred that students did not do well in examination questions that required a written (in words) answer. The students' forte was their ability in Mathematics. Their weakness was felt to be their writing and their inability to satisfactorily answer questions that required an explanation. Over the years, a tradition had developed in Uniten, to exclude questions that required explanation, or if included, to keep these to a minimum. Students are therefore mainly tested on their mathematical knowledge.

However, students will need to face written explanations when they move into their second, third and fourth years in the faculty. An inability to write clearly, demonstrating their understanding and knowledge, would put students at a disadvantage that they surely can ill afford.

Having reviewed the findings of the study, it would now be pertinent at this juncture to look at the implications of the findings, especially in relation to how they may be addressed by an ESP programme.

5.3 Implications of the Findings

In this section, the implications of the findings will be discussed in relation to the fourth research question:

Question 4: How could an ESP programme address student needs in the content-area classroom?
As with the previous section, this section will be approached via the broad themes that emerged upon analysis of the findings. In each area, how an ESP programme could address student needs will be discussed. In order to anchor the discussion, the succeeding section will afford an overview of the situation at Uniten.

5.3.1 An Overview

Currently, Uniten provides an ESL programme for students who are selected for its various faculties. In this programme, all the four skills of listening, speaking, reading and writing, are taught. However, these are taught for general purposes and the material presented to students involve topics of general interest. They are not specifically geared for science students, nor do they address the problems that would be faced by students in a scientific environment.

In the light of the findings, this researcher is of the opinion that an ESP programme, especially designed for Engineering students, would be of greater benefit than the more general ESL programme. This is because the ESP programme would be able to better focus on specific areas of student need and thus better prepare students for the academic tasks they will face in the faculty.

Also, the findings will inform an effective ESP programme which will allow for a speedy 'academic socialization' into the discourse community of choice (Swales, 1994). They (the findings) will also highlight the rules by which success/acceptability etc. are measured in the target language system (N. Chitravelu, 1993).
This ESP programme would need to be pitched at a specific level in order to be able to be of benefit to the students. This level should be equivalent to the 550-point cut-off mark of the TOEFL examination that is currently the requirement at Uniten. This is because the work in the content-area classroom is exclusively in the English medium, and students with a lower proficiency in English would not be able to cope.

Given the above, it would be appropriate at this juncture to examine how the findings revealed in this study relate to course design – specifically its implications for a reading and writing programme for first-year Engineering students.

5.3.2 Implications for Course Design

As mentioned earlier, an ESP programme especially designed for the Engineering Faculty is necessary if students are to be adequately prepared for the tasks they will face in their content-area classrooms. Students’ special needs in reading and writing must be addressed by this programme.

However, it needs bearing in mind in the formulation of such a programme, that the ESP practitioner cannot stand alone. For effective teaching and learning to occur, the language teacher and the content-area specialist would need to join forces and agree on some common ground on which to work.

The tasks designed for the ESP classroom must reflect the academic tasks before the student in his content-area classroom. Bearing this in mind, in the sub-sections that follow, the implications of the findings are discussed in relation to students’ special
needs in reading and writing. Immediately following, will be a discussion on the implications of the findings with regard to the teachers involved, and to materials development.

5.3.2.1 Implications for Reading

In the light of the findings in this area, it would appear that reading in the content-area classroom is not as it is in the literature classroom, or even in the English language classroom. And it must be remembered that until he reaches tertiary level, in the Malaysian context, a student has almost nothing to read and write in English, outside his ESL classroom. Upon entering a university, however, this changes. This is especially so at Uniten, where he would need to read and write in English exclusively.

Bearing this in mind, it would be necessary for the ESP facilitator to call into play the different views of reading and empower students to read effectively. Areas that need to be addressed would include the content and rhetorical structure of scientific texts, as well as the reinforcement of the students’ linguistic knowledge of texts.

The findings suggest that background knowledge, or schema, plays a pivotal role in the students’ understanding of the material they read. The role of the ESP programme here would be to enable students to activate this schema which they already have in their first language, and to call it forth and utilize it in English for their reading purposes.
Hence, the ESP class would enable students to take the first steps in the acculturation process – making the switch from an all-Bahasa Malaysia medium to an all-English medium. It would enable students to come to terms with the various aspects of the scientific text without threat of poor marks for an assignment or examination answer that could decide their future in the Engineering faculty.

The findings also revealed that much of the scientific text before the student is in the language of formulas, equations, symbols and calculations. The student needs to learn how to transfer the knowledge he already has of these in his first language, into knowledge that can be called into play in his second language, that is, English. The ESP programme would need to address this issue, devising opportunities for the students to learn and practise this learning in English. (*Please see Section 5.3.4, p.139 – Implications for the Teacher*)

Students would also need to be taught to utilize all the visual features in the text – the charts, graphs, pictures – and to incorporate the knowledge to be found in these with what he gleans from reading the text. The student would need to learn that these visual stimuli work *with* the written text to create meaning for the reader.

To facilitate comprehension further, it would be useful for students to be made aware of the macro-structure of scientific texts. The ESP programme would need to include exercises that enable students to recognize this macro-structure and to use this in their attempt to create meaning from what they read, thus enabling them to read effectively. For instance, students felt that texts were confusing, or that they were unable to follow the writer’s method of reasoning. Teaching students about the ‘problem-solution’
nature of scientific text could help them analyze what they read, and unfetter the secrets locked in the text.

The ESP programme should also address the need for students to read widely and critically. The finding that students felt that 'one textbook is enough' is a practice that should not be encouraged to persist. Students need to be made aware of the benefits of wider reading. The ESP programme must include opportunities for students to read from more than one source, and exercises that require them to synthesize such information into a coherent piece of work.

Again, students need to be introduced to the strategy employed in scientific writing that enables writers to distance themselves for their writing. The strategy of hedging is an important aspect of scientific writing that students need to master both for their reading and writing needs. Enabling students to recognize this technique of writing, and to also acquire the necessary skills to produce such writing themselves, should prove invaluable as they progress to higher levels in the faculty.

Currently, students have not been guided to see the importance of reading widely, accepting what they find in their textbook as absolute truth. While this practice may suffice at first-year level, it will not suffice for the later years. There will be a need to read for different views on a subject, and even to be able to distinguish between opinion and statements of fact when they read. An experience with different texts could be begun in the ESP programme, and prepare students for what they will face in the content-area classroom both in their first year there, and for the years to come.
Having looked at the role ESP could play in preparing students for their reading experience in the content-area classroom, it would be relevant to now look at its role in writing, the other issue under study.

5.3.2.2 Implications for Writing

The findings suggest that writing, as it is understood in the ESL classroom, does not have a very significant role in the first-year content-area classroom at Uniten. Over the years, their experience with Malaysian student-writing has led lecturers here to design examination questions that focus on the mathematical aspect of the subject, and to not tax their students' limited abilities in expressing themselves via writing.

However, both Specialist Informants noted that writing does play an important role in the later years in the Engineering faculty, and that students would need to explain and discuss topics then. Hence, it would seem that the current status assigned to writing at Uniten leaves its students at a distinct disadvantage. How will students contend with writing assignments or essay-type questions in examinations if they do not learn how to do these in their ESP programme or in their first year in the faculty? This researcher feels that it is imperative that a comprehensive writing programme be initiated in the ESP classroom, and that this be followed through in the content-area classroom – as essential tools for students' later years in the faculty.

There are many elements that make for good writing. One of the areas that the ESP programme should address is the idea of 'audience'. Students need to be made aware that the including of detail, and a display of understanding in whatever they write is
essential. This will demonstrate that they have read in preparation for the task and that they have knowledge in the area in which they are writing. The findings revealed that students' writing that showed evidence of reading were rewarded with more marks. Students should therefore be taught how to include detail in scientific writing, and how to echo elements of what they have read in what they write.

Again, another aspect of writing that would need to be addressed by the ESP programme would be the need to teach students to write in a clear and logical manner. Exercises that are introduced to teach this element could include the manner in which to write up procedures and processes, and how to present information in a logical manner.

Another aspect of the writing process that students would need to be equipped with, is the need to understand the rubric of questions – be they in their homework assignments, or in examinations. Questions that include the terms ‘explain’, ‘discuss’, ‘evaluate’, and etc., need to be addressed in the ESP classroom. The findings reveal that many students did not attempt to answer questions that required them to provide essay-type responses. The ESP programme could teach students the necessary elements that make up a ‘good’ answer. This could include how to produce introductions, when to provide explanations, and generally prepare students for adequate writing. Learning the techniques necessary for the answering of essay-type questions should afford students the confidence to attempt them, and consequently prepare them for the type of work they will need to perform in their later years in the faculty.
Thus far the two skills of reading and writing have been discussed separately. However, the findings suggest that they would be better reviewed together. This is suggested by the fact that reading is seen as ancillary activity – that it is via reading that the student is best able to handle the other skills, especially writing. Hence, in the next section, the focus will shift to how reading and writing work in tandem to make for the more accomplished student.

5.3.2.3 Implications for Reading-into-Writing

As posited earlier, reading is an ancillary activity and the take-off point for the accomplishment of all other academic tasks. As such, the ESP programme could be utilized to enable students to use the two skills of reading and writing together, to make for better proficiency in both skills.

Students should be guided to realize that there is a very real connection between their reading and how they write. The ESP programme should focus on enabling students to understand how reading widely will help them internalize how scientific texts are written, and how this knowledge, in turn, will be reflected in the students’ writing.

The programme should endeavour to encourage students to read from one, and then many sources, and to then record the knowledge they have gleaned, in the form of notes. They would then acquire the expertise to use reading to access information, and use writing to anchor their thoughts on what they have read. This will allow them to make the connection between reading and writing, so necessary for their academic success.
An important finding of the study was the fact that much of the discourse of the science classroom involved numbers – formulas, equations and calculations that spoke volumes in the meaning that they carried for the members of the community under study. The ESP programme will need to address this issue. In this area, the language teacher must consult with the content-area specialist to enlist his help to explore how effective teaching and learning can be effected. (*Please see Section 5.3.4, p.139, below*)

A final note to this section, must include the mention that students need to realize that what they learn in the ESP classroom is valuable preparation for what they will encounter in the content-area classroom. Presently, what they are taught in the ESL programme is not seen by students to be relevant to their experience outside this classroom. It would thus be necessary for the ESP programme to stay focused on students' future academic tasks, and students need to be pointedly made aware that the skills that they learn in the ESP classroom are taught specifically to be called into play and utilized in the content-area classroom.

Thus far, the implications of the findings have been discussed in relation to the specific needs of the students. It would be pertinent now to examine the implications of the findings with regard to materials development, and then to the ESP teacher.

**5.3.3 Implications for Materials Development**

In the endeavour to address the specific needs of Engineering students, it would be necessary to discuss what criteria need be applied in the selection and development of
materials relevant for student needs. One of the findings of the study revealed that students were not able to reconcile what they had learnt in the ESL programme with what they were required to do in the faculty. In order to address this issue, it is imperative that the academic task designed for the ESP programme, reflect the academic tasks that students need to contend with in the faculty.

Hence, it would be necessary for the language providers to consult with the content-area specialists, and select texts that are appropriate for the students. If materials selected are to reflect the content that would be encountered by students in the faculty, then the quest for authentic texts and authentic tasks, as argued for by Bhatia (1994) is crucial. This would include readings in the content-area, visual stimuli (diagrams, graphs, tables, pictures, etc.), as well as formulas and equations. Students would then need to be introduced to the norms (as perceived by the target community) in this scientific genre, and learn how to use it effectively.

As mentioned earlier, the tasks that students are required to perform in the ESP classroom must also reflect the tasks that they do in the content-area classroom – be ‘authentic’ tasks. Again, it would be imperative for the language providers to work closely with the content-area specialists to discover what is deemed important, and then to focus teaching on those areas. Students would then need to be guided on how to use the materials before them, and to produce the required pieces of work.
5.3.4 Implications for the Teacher

In attempting to formulate an ESP programme that addresses the specific needs of first-year Engineering students, it is imperative to address the role of the language teacher in this programme. It is evident that the challenge before her would be that she be required to work in 'new' areas and prepare her students for academic socialization in a faculty with which she is not familiar. While this may prove a daunting task for the ESP practitioner, it is nevertheless, an essential role that she must learn to play.

For instance, the findings reveal that much of the work that students are required to do involves mathematical solutions. The language teacher would need to reconcile herself to the fact that she will receive answers in 'numbers' rather than in words. In order to facilitate learning, the language teacher would need to work closely with the content-area specialist to discover when a numerical answer will suffice, and when an answer calls for a written explanation.

Again, to be effective, it would be necessary for language teachers to consult with content-area specialists. They will be crucial in informing the language teacher on how students can be guided in this area. There is room here for innovative teaching methodology, that can include team-teaching or shared work that will enable the students to benefit from the wisdom and expertise of both the parties involved.

It would seem that a basic knowledge in the one of the many disciplines of science would hold the language teacher in good stead. This would enable her to understand the texts she is confronted with, and enable her to facilitate learning in her students.
Again, the language teacher would need to familiarize herself with the types of writing required in a scientific context. Only then would she be able to impart knowledge of the rhetorical structure of scientific texts, and enable her students to recognize and become familiar with the manner in which knowledge is handled in this genre.

Another area in which the ESP teacher must persevere is the area of reading. She must instill in her students the need to read widely, and enable them to understand the value of reading from multiple sources to inform their writing, and ultimately increase their knowledge in any given area.

However, it needs to be stated that the endeavours of the ESP teacher will come to naught if the content-area lecturers do not reinforce this need to read widely in their classrooms. Hence, it would be prudent for faculty, from both the language department and the Engineering faculty, to agree on a course of action that could help motivate students to move in this direction. Programmes should be devised that include reading, and these should be incorporated into the final assessing of a student’s ability in a particular subject.

Essay-type questions must return to the Engineering classroom – both in students’ homework assignments and in examinations. Only by working at their writing can students be adequately prepared for their target community. Excluding the writing component from the first-year programme only leaves students at a disadvantage. Rather than wait for problems to surface in their later years, it would be prudent to
prepare them adequately from the start – beginning with the ESP programme, and reinforced by regular written work in their first year in the faculty. Ultimately, students must be able to comfortably study questions before them, read up on the relevant areas, and be able to apply the knowledge gained via reading to the solution of any problem – effectively demonstrating their knowledge in the given topic.

Finally, one other area brought to light by the findings, is the passive nature of students in the Malaysian classroom. Lecturers in the content-area classroom often faced difficulty gauging students’ understanding during the course of a lesson – as students seldom asked questions or revealed that they did not understand.

The role of the ESP practitioner in this area would be to try to help students to overcome their inhibitions in class. One method could be to offer students help in framing questions to ask for guidance, or to inform the lecturer that they do not understand. Perhaps armed with the appropriate vocabulary and politeness markers, students may overcome their shyness and ask for help in class when they need it.

5.3.5 Conclusion

It would appear that an ESP programme could address many areas regarding reading and writing needs in the Engineering classroom, that are not adequately addressed by the current ESL programme. Being able to master these required skills would go far towards effectively preparing students for the academic tasks before them in their target community. However, these are not the only skills that a student need master. It warrants mention that the skills of listening and speaking, though not covered in
this study, also figure in the complete picture of student experience in the content-area classroom. Hence, what is taught in the ESP programme must incorporate work in the four skills, thus empowering students to work effectively and efficiently in achieving their academic goals.

5.4 Suggestions for Further Research

The present study focussed on the reading and writing experience of first-year Engineering students. Other skills the students needed to bring to the content-area classroom were looked at only in so far as they informed the analysis underway, and paved the way for a holistic view of the reading and writing experience of the students.

Consequently, another area that could be explored would be the role of listening and speaking, either individually or together, in the content-area classroom. It would be worthwhile to note what students are required to listen to in the classroom, when this skill needs be called into play, and to appraise its role in how students perform the academic tasks before them.

Again, the skill of speaking in the content-area classroom is another worthwhile area for research. Do students need to speak in class? It would appear from our cursory glance into the classroom that there is a role for speaking here. Questions that need answering in this area would include, when and why speaking in class is important, and the level of proficiency of speech required of the student in order to gain
academic acceptance. Relevant to the Malaysian situation would be the need to explore how local students are assessed in this area by foreign lecturers. Noted for their passive behaviour, would their passivity and shyness count against them when the lecturer needs to assess their academic ability?

Again, using this study as a take-off point, another area that could be included, but was beyond the scope of this study, would be the analysis of the actual texts used in the Physics and Chemistry classroom. An analysis of the text would afford the ESP practitioner actual elements from the text on which to focus his teaching. This could include the broad areas of text organization, the manner in which scientific ideas are presented and linked, and the actual vocabulary that students need to be acquainted with and finally master, in order to derive meaning from the text.

This study concentrated its analysis on the course subjects of Physics and Chemistry only. It would be pertinent to discover if the findings of this study would hold, or prove dissimilar, for research into Mathematics, Biology, or any one of the other science classrooms. It would prove of interest to the ESP practitioner, for instance, to discover if there is a role for writing (as it is understood in the ESL classroom, or as discovered in this study) in the Mathematics classroom.

Further to the above, would be to analyze the actual written texts required of students in the science classroom. These would perforce include lab reports, the writing up of procedures, and actual examination answers, for example. Such an analysis would suggest what the scientific community deems to be important in these documents, and these, in turn, can then be taught to students, thus affording them an opportunity to concentrate on those aspects of writing that pertain to their discourse community.
This study was conducted on a total of 60 students. At best, the findings obtained relate to the situation at Uniten, and could be extrapolated to represent the experience of other students that enroll at a tertiary-level scientific course. However, it would be better able to serve the needs of extrapolation if the study was replicated over a greater population of students, and included more than one higher institution of learning. In that way, the findings of the study would be more generalizable, being more readily quantifiable and hence lend itself to extrapolation to other populations of students.

A natural follow-up study, to the study within these pages, would be to continue to observe these same students as they progress to their second, third and fourth years at Uniten, and then to the U.S. It would be pertinent to discover if the findings recorded here still hold true, or whether there are new experiences that open up for the students, and whether these students could be helped to deal with these via an ESP programme further to that suggested here.

5.5 Conclusion

This has been an exploration – a journey of discovery into the content-area classroom – a glimpse for the language teacher into a ‘new’ environment. It has traced how students received content-area instruction in English, sought and derived information from their texts, and then how they transferred the knowledge gleaned into writing. Finally, it explored the role an ESP programme could play to help students cope with the acculturation process as new members of a discourse community.