Learners were encouraged to practice these techniques both in and outside the classrooms. Furthermore, the input they received in the form of reading practice in various kinds of scientific texts served to immerse them deeper in their specific disciplines and had the added effect of encouraging them to voluntarily read more.

To some extent, it was also necessary to pay attention to vocabulary that learners encountered in academic discourse (Cummins et al, 2007). Indeed, the needs analysis indicated that a significant 87% of learners expressed a desire for more practice in this aspect of language. Hence, because of the importance attached to them for the development of scientific understanding, a list of basic vocabulary peculiar to each discipline was gathered with the cooperation of subject teachers. In this way, language learning was a conscious exercise that required interaction with written material and that enabled students use the knowledge gained as a launching pad for individual writing. The approach adopted concentrated on what Lorenzo (2005) described as teaching "language in content rather than on teaching grammar" (p.43). Even though some grammar, lewis, register and discourse that were in consonance with the practical needs of the learners had to be taught (Umera-Okeke and Okeke, 2014). This was necessary as the needs analysis indicated the prevalence of wrong use of tenses (45%), errors of agreement (48%), choice of prepositions (52%), sentence construction and ambiguity (26%) in students writing (Ibrahim, 1988).

Writing skills was also emphasized as students were expected to note their observations, gather data from investigations, analyze, interpret and write about their findings. The writing component therefore provided structured practice on a variety of technical report writing such laboratory reports, experimental researches, field studies, surveys and case studies. As technical writing requires distinct linguistic functions to be performed, considerable time was spent dissecting the mechanics of such writing in an attempt to expose learners to the "formulae" of scientific material. For instance, in experimental research reports, there was need to introduce the topic, to include procedural descriptions, the equipment used, the methodology followed and to write about findings. Once familiarity was established, learners were expected to be able to repeat the same format in their own writing. This approach represented a significant shift from a product-focused course to one that was more process oriented as learners were required to write in a series of steps that progressed from one stage to another. They could review, amend or correct what was set down before concluding writing tasks in a "recursive process" that made for more effective writing.

Method

As text books tailored to specific needs in EST were not readily available in Nigeria, language teachers had the choice of either producing fresh instructional materials or adapting the existing ones in science and technical texts to suit their purpose. To this end, discipline-specific materials were jointly developed with subject teachers. Workshops held at the various Universities of Technology also engendered valuable collaboration that resulted in the production of teaching and learning materials for different aspects of the EST course. The quality materials produced was high because they were subjected to peer-review before being utilized in the classroom. Feedback on them was the shared at the conferences of the National Association of Teachers in English as a Second Language (NATRESL) as well as in an annual journal. But while keeping in mind Hutchinson and Waters (1987) suggestion that the course materials include 'interesting texts; enjoyable activities which engage learners' thinking capacities' (p.107), it was also important to create materials that allowed learners to bring previously acquired knowledge to bear on tasks. Hence, the materials produced focused not only on language and activities appropriate to disciplines of the students but also served to motivate further learning by engaging students' interest. However, the danger of demanding too high a level of specialist knowledge from them was overcome by using materials based on general science knowledge that were relatively accessible. In some instances, the material brought to their attention by science subject teachers were simply adapted to teach particular language skills.

For two decades (1986-2006), the EST course at FUT, Minna followed accepted ESP guidelines by which students' language needs informed the course that as designed and taught. Apart from regular assessments in form of tests, feedback on the success of this approach came first from subject teachers in the science and technology departments who noticed improvements students' reading and writing skills, and also importantly, from employers of labour who commended the communicative abilities of FUT students on work placements (Akamu, 2012). However, by 2006, the situational context of EST in Nigerian institutions began to change and to impinge on the effectiveness of the course prompting the question posed by Dudley-Evans about whether ESP is being delivered in the classroom.

Appraisal of Practice of EST at FUT, Minna

Presently, the challenges that the EST course appear to be experiencing emanate from factors that can be categorized as follows:

1. Institutional Factors

Originally designed to be taught in six contact hours per week over the period of four semesters in the Foundation class and first year undergraduate studies in the then English Department, EST has

become a service course under the General Studies Unit and is currently compressed into a two semesters course with two contact hours per week. The addition of five new schools, School of Information and Communication Technology (SICT), School of Infrastructure, Process, and Engineering Technology (SPET), the School of Entrepreneurship and Management Technology (SEMT), School of Physical Sciences (SPS) and School of Life Sciences (SLS) have increased the student population to over twenty thousand out which about four thousand enroll every year for the now one-year Use of English course. Although the course has remained a compulsory graduation requirement for all students, official management attitudes towards it has resulted in marginalization of EST in terms of resources and classroom hours allotted to it. This recalls Hutchison and Waters (1982) assertion that the number of hours allocated to English on the timetable reflects the true importance attached to language learning rather than any imagined value that may be attributed to it. Furthermore, there is little provision of appropriate technology that could help ameliorate the difficulties teaching EST in large classes.

2. Teacher Factors

Teaching EST has become an energy-consuming activity for teachers because of large class sizes. The initial a ratio of one teacher to 40-50 students has rocketed to 500-1000 learners to a single teacher as additional teachers have not been recruited. As a result, classroom sessions have become increasingly teacher dominated with the learners receiving less feedback on assignments. For EST practice to be effective, teachers need to be able to diagnose learners' problems through regular needs analysis in order to serve students' needs and to deliver the course successfully. The collaboration between EST teachers and colleagues in science departments that helped to create the course has waned over the years yet it is still needed for the production of discipline specific learning materials especially for the new academic departments. And without institutional support in the form of funding and trainings, new language teachers are left to their own devices. The danger is that they could revert to the General English teaching methodology with which they are more familiar. However, in an effort to remedy this, in house workshops are periodically conducted by two of the teachers who were part of the earlier trainings conducted by ESP experts when the British Council provided the funding required.

3. Learner Factors

Learners needs and interests "have an important influence on their motivation to learn and therefore on the effectiveness of their learning" (Hutchinson and Waters, 1987, p.8). By focusing on the language of specific disciplines, learners were motivated to invest time and effort in advancing their use of English. While then, learners were supported in tackling unfamiliar learning tasks, presently, the limited time allocated to EST has restricted the scope of learning activities with which teachers

could engage their interest. But under pressure of inadequate time, manpower, and overly large classes, effective classroom practices such pair or group activities as recommended by the ESP approach have been abandoned.

Survey of Learners

As Hutchinson and Waters (1987) state, the aims of ESP/EST courses are to meet students' pragmatic and learning needs, hence, the need to find out to what extent this is being accomplished. Therefore, in the light of challenges being experienced at FUT, Minna, a descriptive survey research was conducted to assess how effectively the course meets the needs of present learners. The research instrument used was a questionnaire made up of three sections that sought learners' views on three key aspects in order assess to efficacy of the course. Out of a student population of about 4000 students who take the course, responses were elicited from 300 students from three randomly selected schools, specifically, the School of Engineering and Engineering Technology, School of Physical Sciences and School of Science and Educational Technology. All the questionnaires were returned as they were administered immediately after EST classes ended. However, although designing a survey that includes teachers' views would have provided more insights into EST at FUT, Minna, the one below is necessarily limited to learners because of constraints of time and space and also because the learner-centered EST approach is primarily concerned with them.

Results

Below are the results of the data collected from the questionnaires. Section A focuses on learners' assessment of the EST teachers; Section B is on learners' assessment of course materials; and Section C assesses learners' satisfaction with the course as a whole. The data collected was analyzed using a five point Likert rating scale of Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree to weigh responses.

Table 1: Section A- Students' evaluation of EST lecturers

	EST Lecturers are	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Are well prepared and show deep knowledge of the course	33%	54%	10%	3%	
2	Present learning materials effectively	20%	57%	3%	16%	4%
3	Link the course modules with each other	17%	63%	6%	12%	2%
4	Clearly explain methods of assessments at start of the course	36%	39%	7%	18%	

5	Provide students with feedback after assessments	16 %	30%		36%	18%
6	Encourage students to self-directed learning	20%	23%	2%	40%	15%

Table 2: Section B- Students' evaluation of course materials

	The course materials are	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
1	Are appropriate for students of science and technology	30%	47%	5%	12%	6%
2	Stimulate student's interest in the course	23%	46%	4%	17%	10%
3	Contain knowledge that students need for their specializations	40%	33%		19%	8%
4	The following aspects of course are useful for my academic work					
a	Understanding and answering examination questions	26%	64%		8%	2%
b	Reading techniques	30%	54%	6%	7%	3%
c	Report writing	37%	54%	4%	5%	
d	Study skills	30%	54%	5%	9%	2%

Table 3: Section C- Students' overall evaluation of EST course

	The EST course	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Has clear learning outcomes	26%	46%	8%	14%	6%
2	Is given adequate hours on the timetable	20%	24%	2%	30%	24%
3	Is held in adequate classroom space	5%	12%		37%	46%
4	Is good for my future career	30%	40%	2%	23%	5%
5	The University has high regard for the course	30%	46%		16%	8%
6	Overall satisfaction	21%	49%	4%	20%	6%

Discussion

Students' evaluation of EST lecturers

The level of teachers' knowledge and competency was rated highly by 87% by learners. 77% approval rating was given to teachers' ability to effectively present learning materials in the classroom. This is surprising as three out of the five EST teachers feel that they could do better if exposed to the kind of trainings that the two older colleagues had received under internationally renowned ESP experts. However, the score suggests that the periodic workshops mounted in the General Studies Unit by those who had benefitted from them are yielding results. It is similarly satisfying that students could see the connections between the different modules that constitute the course. However, when asked about the amount of feedback they receive after assignments, a considerable 54% rated the teachers poorly. This could be because of the high student population. It is difficult for only five teachers to teach, assess, and monitor the work of over 4000 students on a regular basis. Assessments have been reduced to one class test and one examination per semester which is inadequate for a language course which requires more frequent evaluation to ensure that learners get the best from the teaching and learning process. The poor rate of feedback is also not helped by the fact that self-directed learning is not properly supported by teachers as 55% of the students rated them low in this aspect. This also implies that learners' motivation to advance individual learning would be less.

Students' evaluation of course materials

Course materials are important resources in the EST classroom, hence, students were asked to express their opinions on the materials used. 77% of them found the materials used were appropriate because they contained knowledge useful for their fields of specializations. 69% felt that the course stimulated their interest in scientific English which bodes well for continued efforts to improve their grasp of it. Major aspects of the course such as understanding and answering examination questions got 90% approval rating, reading techniques 84%, report writing 91%, and a large majority of 84% learners were satisfied with study skills that they were taught. These are high scores indicate that materials were carefully selected and developed to meet learners' specific needs. The success here is likely due to the earlier work done in collaboration with science departments lecturers who identified areas of academic work in which students need the most help. This is positive result as EST is particularly concerned with giving learners the language skills they need for academic work. It is also substantiates Taylor's (1994) assertion that language teachers could find ways to overcome their lack of science and technical knowledge and deliver the course successfully.

Students' overall evaluation of EST course

Learners' overall view of the EST course was mainly positive. 72% believed that learning outcomes were clearly outlined at the beginning of the course which indicates that they knew what to expect right from the onset. However, the amount of time allocated to EST on the timetable needs to be increased because even though 54% indicated that present arrangement is adequate, 49% are not in agreement. Learning space elicited the most negative response. An overwhelming majority of 86% found it to be grossly inadequate as not enough class room provision is made for the large number of students who take the course. Indeed, students sometimes have to hang by windows in order to listen to lectures. This is far from an ideal learning environment nut also an indication of the students' determination to acquire learning in spite challenges encountered. The high rate is dissatisfaction could have been an indictment of the university management, but surprisingly, when asked about the status of course in the institution, 76% of learners responded in the affirmative. This response could be because they are aware that EST is considered a compulsory graduation requirement by the university. On overall satisfaction with the course as a whole, learners were equally divided in opinion with 51% approving the course while 49% of learners disagreed. That being the case, certain aspects of the course including such as timetable allocation and classroom space need to be improved urgently so as not to exert undue pressure on the coping capacity of both learners and teachers.

Conclusion

This review set out to highlight the need to take context into consideration when examining the practice of ESP/EST because scrutiny of actual practice could help inform future directions of this approach to language learning. As Hewings (2002) opines, the importance of ESP/EST course lies in its international character as it is usually adopted in countries where English is second language. As the FUT, Minna example demonstrates, learning context can impinge on its effectiveness of EST thus taking a step back to recollect why and how the course was implemented in the first place and assessing it from the point of view of present learners helps to gauge how well it was established and to ascertain if it still meets learners' needs. Interestingly, some assumptions stated earlier are challenged by the learners' views on the ability of the course to serve their needs. From the survey, it appears that learners appreciate and value the course in spite of the problems being experienced because they see the relevance of EST for their academic work and future careers. However, the biggest obstacle to the effective running of the course appears to be institutional as insufficient human and physical resources are allocated to it by the university management. While positive responses dominate in all sections of the survey, the negative feedback on learning conditions could be used to improve how the course is handled. Therefore, in order to retrieve EST from the margins of the

undergraduate academic programme that it presently occupies at FUT, Minna, the following recommendations are made.

Recommendations

First, there is urgent need for a clear government policy that emphasizes the relevance of English language instruction in tertiary education (Adegbija, 2004:210). Furthermore, for the EST approach to be effective, adequate funding for the recruitment of more teachers and their retraining in the EST approach is necessary for teaching and learning to be conducted successfully. Similarly, adequate facilities and resources need to be provided in order for the course to yield desired results. The importance of EST would also be enhanced if the current "Use of English" title of the course is changed to "English for Science and Technology" that it is designed to be. Doing so would help to prioritize it for university management, the new generation of language teachers as well as learners. Finally, there is need for periodic reviews of the course to ensure that it delivering the language learning it intends and also to enable adjustments where necessary. However, taking these steps that will enhance the status and quality of EST requires all that stakeholders, language teachers, institutional authorities and the government reassess the reasons why learners needed ESP/EST in the first place.

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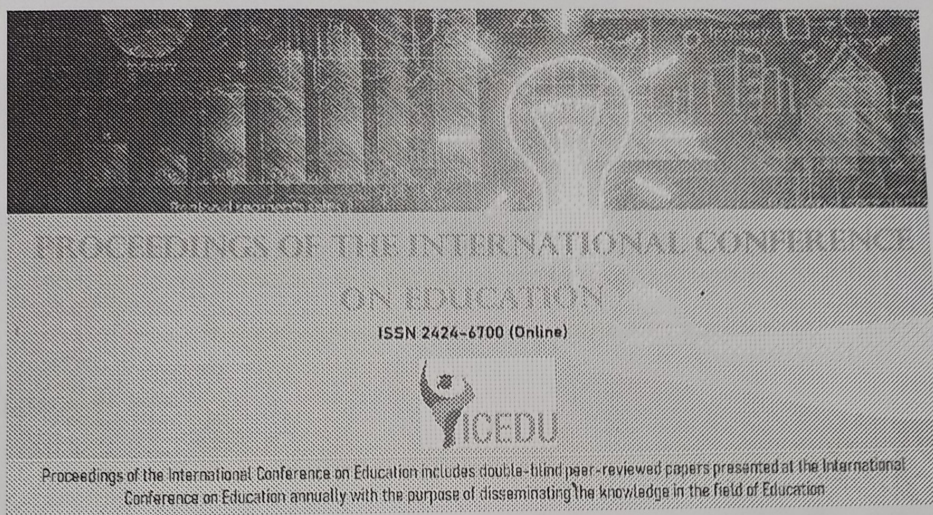

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Articles

ADVERTISING EDUCATIONAL INSTITUTIONS THROUGH ONLINE MEDIA DURING THE COVID-19 SITUATION: A CASE STUDY IN THE INTERNATIONAL COLLEGE OF KING MONGKUT'S UNIVERSITY OF TECHNOLOGY NORTH BANGKOK

1-11

Puntarika Rawikul, S Ammapuk, N Labkim, T Pewpong, M Po

PDF

ENGLISH FOR SCIENTIFIC PURPOSES: A RETROSPECTIVE APPRAISAL OF PRACTICE AT FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

12-26

Hellma Shehu

PDF

THE PERCEPTION OF TECHNOLOGICAL TOOLS USEFULNESS TO DEVELOP MEDICAL CLINICAL SKILLS AMONG POSTGRADUATE MEDICAL STUDENTS

Oscar Gutiérrez, Belinda Carrión, Salma Andrade, David Reyes 37-87

PDF

EVALUATING THE IMPACT OF SELF-EFFICACY ON ONLINE LEARNING OUTCOMES OF STEM COLLEGE STUDENTS

Hao Huang Huang, Yuan Gao, JiaJun Liu 78-88

PDF

THE EFFECTS OF LONG EXPOSURE TO SYNCHRONOUS ONLINE COURSES ON THE COURSE'S ENGAGEMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING STUDENTS DURING THE COVID-19 PANDEMIC

Alejandro Sandoval, María-Rubí Forte-Celaya, Luis-Fernando Reséndez-Maqueda, Beatriz Murrieta-Cortés 54-68

PDF

TEACHERS' AND STUDENTS' VIEWS ON THE USE OF SONGS IN TEACHING AND LEARNING IONIC BONDS

Omollo, Massam 69-85

PDF

DEVELOPING BLUEPRINTS FOR THE IMPLEMENTATION OF VIRTUAL REALITY ROLE-PLAY TO IMPROVE COMMUNICATION AND DIGITAL SKILLS IN TRANSNATIONAL COLLABORATIVE LEARNING

S Jung, M Arnold 86-95

PDF

DEVELOPMENT OF CURRICULA FOR INCLUSIVE AND ACCESSIBLE TOURISM: EXPERIENCES FROM THE ERASMUS+ PROJECT IN-TOUR

M Richter, M Arnold, J Müller 96-106

PDF

APPLICATION OF SELF-REGULATION IN PIANO LEARNING

Suqi Dong, Professor Genutė Gedvilienė 107-112

PDF

UNDERSTANDING THAI UNIVERSITY STUDENTS' PREPAREDNESS FOR UNIVERSITY

Mariano Carrera 113-124

PDF

ARTBOTS IN SPECIAL EDUCATION: POSSIBLE APPLICATIONS AND BENEFITS

Anastasia Zoi Soulioti 125-135

PDF

INFLUENCING FACTORS FOR THAI GENERATION Z ENTERING WORKFORCE

Ms. Sukhansa U-Dee, Achareeya Robkit, Birgit Vock-Wannewitz, Gerhard Feldmeier, Pichet Sriyanyong 136-148

PDF

FACTORS INFLUENCING THE RETENTION OF GENERATION Y EMPLOYEES IN THAILAND

Ms. Pisittha Kuttho, Assistant Professor Dr. Achareeya Robkit, Birgit Vock-Wannewitz, Gerhard Feldmeier, Peter van Haren, Associate Professor Dr. Pichet Sriyanyong

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ENGLISH FOR SCIENTIFIC PURPOSES: A RETROSPECTIVE APPRAISAL OF PRACTICE AT FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

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Abstract: The concept of English for Specific Purposes (ESP) was embraced in Nigeria in 1984 as an innovative methodology that would address students' deficiencies in higher academic reading and writing. The learner-centered approach advocated by Hutchinson and Waters resulted in a new course being designed to teach the ESP sub-category known as English for Science and Technology (EST) to prepare learners to communicate effectively in their fields of specialization. For two decades, this approach impacted positively on language use but in recent times, challenges that adversely affect the quality of student learning and by implication the much desired development of science and technology in Nigeria have become apparent. While much research has been conducted in ESP, the question of how well ESP courses are being delivered in the classroom has largely been overlooked. Hence, these retrospective reviews the process of implementing an ESP/ EST course at FUT, Minna and the difficulties of maintaining teaching and learning quality. The efficacy of the course is examined via a survey of present learners' views on teachers, course materials, and overall assessment of the course which revealed that the institutional status of the EST course, teachers' skills and government policy are key factors for the success of this language approach. Some recommendations follow that will help inform the conduct and future direction of the ESP/EST in second language learning contexts such as found in Nigeria.

Keywords: English language, ESP, EST, learner-centered, reading, writing

Introduction

In the late 1960s, English Language Teaching (ELT) shifted attention away from the formal rules of English grammar and lexis to the ways in which the language is used in real communication. This change was more evident in the field of English as Second Language (ESL) which strove to give learners access to the language they both want and need in order to accomplish academic or occupational goals (Belcher, 2010; Javid, 2013). The realization that the use of English varied from context to context then gave rise to English for Specific Purposes (ESP) which became an area of research and instruction concerned with the needs of and practices of specific language users (Master, 2006). The ESP approach shifted focus from what people learned (language-centered) to how people learn (learner-centered) in contexts where English is not the mother tongue (Hutchinson & Waters, 1987; Dudley-Evans, 1998; Hyland, 2019). Fundamentally pragmatic in nature, issues of purpose,

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specificity, learners' needs and authenticity are the core concerns in ESP (Wette, 2018; Fiorito, 2019; Salmani-Nodoushan, 2020)).

As Warschauer (2006) notes, English appears to have become "the second language of everybody". In many ways, it has assisted globalization which in turn has further consolidated it as the world language (Crystal, 2003). Nowhere is this dominance more apparent than in the fields of science and technology where it is employed as the lingua franca (Tardy, 2004, Lowe, 2009). Some studies claim that more than 75% of international scientific communications are written in English (Research Trends, 2008; Hamel, 2007) and evidence of this can also be seen in the quantity of researches in science and technology that are disseminated through the internet where 80% of the world's electronically stored information is also in English. As English appears to be the preferred medium by which scientists exchange information with others of different nationalities, experts in field of language development (Honda & O'Neil, 2008; Orr, 2012) urge that inquiry into English language learning be given a prominent place in science education particularly for students for whom it is a second language (L2).

ESP was first introduced into Nigeria at a conference in Bayero University, Kano in 1984. By then, English already enjoyed a second language (L2) status as the official language of government, corporate business and the media. In the educational sector, it was and still is the main language of instruction. Therefore, due to the problems evident in students' academic work, the Use of English course became a compulsory graduation requirement for all undergraduates. Admission into university was dependent upon a minimum requirement of a credit pass in the West African Examination Certificate (WAEC) which implied a certain level of competence; nonetheless, students exhibited difficulties in their use of English. Consequently, the Bayero conference which was aimed at identifying English language problems peculiar to students in tertiary institutions drew attention to the ESP language approach (Freeman and Jibril, 1988).

As in other developing countries, in Nigeria, the English language is seen as essential for the acquisition of science and technology. Thus, foremost in adopting the ESP were universities that were established to train students in critical areas of national development, namely, science, technology, and agriculture. These included the newly established Federal Universities of Technology, in Owerri (1980), Bauchi (1980), Akure (1981), Yola (1981), and Minna (1983) as well as the Universities of Agriculture at Abeokuta (1988) and Makurdi (1988). For these institutions, adopting a language learning approach that would enable students grasp the nature of scientific inquiry, articulate critical thinking and strengthen problem solving skills in English was deemed necessary for students who would eventually operate in fields of research and development which use it as the medium of communication (Oluikpe, 1993). As "an approach to language teaching in which all decisions as to

content and method are based on the learner's reason for learning", ESP departed from previous language teaching methodologies (Hutchinson and Waters, 1987, p.9). But this emphasis on goal-oriented language learning also made it a better proposition for Nigerian students. Consequently, through the British Council funded Communications Skills Project for Technology (COMSKIPTECH) and with the guidance of eminent ESP scholars such as Tom Hutchinson, Alan Waters, and Maggie Jo St. John, English for Science and Technology course for Nigerian universities were designed.

The period from 1986 to 2006 proved most productive in terms of trainings, workshops, collaborations and researches undertaken into the use of the ESP/EST approach in the classroom. However, that level of activity has declined in recent times. The situational context of EST practice in Nigeria has changed so much with regards to course status, student population as well as resources allocated to it that it has become imperative to inquire into the efficacy of the course. As Dudley-Evans (2001), Master (2006), and Basturkmen (2012)) state, the question "Do ESP/EST programs work?" is an important research issue that is rarely addressed. Yet, there is need for investigations into the effectiveness of this language approach. This study is therefore an attempt to contribute to this knowledge gap by examining how well learners' needs are being met at FUT, Minna.

Literature Review and Theoretical Framework

ESP emerged as a pragmatic response to ineffective practices in the teaching of English as a second language (Ghaffarpour, 2016). It endeavored to meet the needs of learners by taking into account the "the linguistic demands of academic or workplace contexts and the pedagogic practices by which these behaviors can be developed" (Master, 2006, p.309). For Belcher (2010), the goal of the ESP language approach is to provide learners with the language elements they need to function as professionals in specific contexts. Similarly, Mackay and Mountford (1978) define ESP as the use of a variety of English in a specific context and that is justified by the needs of the learners. Providing even more clarity, Hutchinson and Waters (1987) assert that it is an approach to language teaching in which all decisions as to content and method are "learner-centered" that is, based on the learner's reason for learning. Their position is summed up succinctly in the statement: "Tell me what you need English for and I will tell you the English that you need" (p.8). Over the years, ESP has remained a pedagogy driven by learner-centeredness, linguistic analysis and contextual relevance (Johns and Price-Machado, 2001).

However, caution is required when selecting a theoretical framework for research in ESP because it draws upon a number of interrelated disciplines such as psychology, applied linguistics, second language education and pedagogy for its methods and practices. According to Hyland (2019), the strength of ESP comes from its "eclectic theoretical foundation and commitment to research-based

student population was about four thousand out of which two hundred and eighty new students registered for the two years foundation English language course.

The survey conducted of students' expectations and that of their departmental lecturers revealed a significant disparity between the students' awareness of the necessity of English in their studies and the level of competence that their science subject teachers expected of them. 61% of students agreed that the English language was an important factor in accomplishing their academic work but 39% did not consider it necessary for the science and technology courses for which they registered (Ibrahim, 1988; Fashola, 1989). 89% of the students believed that a credit pass in WAEC English was a sufficient measure of their language competence. On the other hand, subject teachers were concerned with how poorly they appeared to grasp scientific concepts and how their knowledge was expressed in written tasks. Therefore, negotiating between the two positions and taking into account the information gathered on the linguistic demands of the different fields of specialization, a two-year EST course that centered on the language and content of the students' disciplines was designed.

Course Design

The decision at FUT, Minna that the EST course would focus on reading and writing skills was informed by the responses gathered from questionnaires as well as from analyses of students' written assignments which revealed that these complementary skills required the most attention (Tswanya, 2012). The emphasis on these skills was also influenced by the fact that teacher/learner interaction was mainly through the printed word (Oluipke, 1993; Aborisade, 1997). Many of the learners struggled to comprehend the specialized language of the sciences which resulted in a reluctance to read materials related to their courses. Consequently, the EST course that was developed aimed at making them make better readers and writers of science and technology subjects.

The reading activities designed focused on how technical texts communicate complex information with peculiar terminologies, concepts, and micro-discourses. Informative texts which imparted knowledge in the form of background or introduction, ideas, concepts, explanations were tackled first and tasks were designed to enable learners comprehend, make connections or critique scientific postulations. Items on definitions, description, sequence, classification, comparison, cause and effect were emphasized to improve the learners' understanding of scientific methods and also to enable them to apply or create information using similar language structures. A combination of flexible reading techniques such as skimming and scanning that make reading less laborious as well as reading techniques that allowed learners decode complex sentence structures, identify and extract main points, distinguish minor details and make inferences were also part of the strategies adopted for effective and efficient reading. Through the questions that were formulated, attention was focused on the reading purposes which not only aided comprehension but also enabled the recall of information.