

SCIENTIFIC/TECHNICAL ENGLISH SKILLS FOR POLYTECHNICSCIENCE AND TECHNOLOGY STUDENTS: A NEEDS SURVEY

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Abstract

As the global community of Science and Technology continues to advance, the requirements for communication in this area becomes increasingly demanding. Science and Technology students of Nigerian polytechnics have special needs in Scientific/Technical Communication. In this work, a Needs Survey of polytechnic Science and Technology English studying students was conducted, to identify their communicative language needs, in order to ascertain how far the prescribed English course fulfils the academic and professional needs of the students. The method of Content Analysis and Survey Technique following an eclectic method of analysis was used for the investigation. The study revealed a number of lacunas/gaps in the English/Communication needs of the students. The paper suggests the incorporation of Scientific/Technical courses in the Science and Technology students' General English courses.

Key words: Scientific/Technical Communication, Needs Survey, General English.

Introduction

In the globalized context, English has today become the lingua franca for science and technology. The language is being increasingly and predominantly employed in the communication of scientific/technical information, concepts, ideas, etc. According to Sasidharan (2012) English language has become the de facto international language of Science and Technology

(S & T). Students of science and technology and engineering therefore have to face this fact while they are students; since books, papers, handbooks, journals etc., on Science and Technology written in English, form the bulk of their recommended study texts.

This study examines the communicative needs of polytechnic science and technology students with regard to their various disciplines. The paper posits that English Language courses in Nigerian Polytechnics should meet the science and technology students' communicative needs, that is, as it applies in real life situations. Sasiharan (2012) conducted a study on identifying essential learning skills in students' engineering education and came up with the findings that majority of employers expressed dissatisfaction with students' communication abilities. Her analysis of research data revealed a list of important skill attributes in the workplace, with the four most highly valued English skill attributes showing a combination of academic and specific job-related tasks as: understanding technical documents, enunciating correct grammar, vocabulary and sentence structures, writing tests, investigation reports and questioning for clarification. Stapa and Jais (2005) conducted a study on the lack of proficiency in writing skills required in the work place. The students involved stated that the English programme that they were exposed to before their practical job training was inadequate for workplace writing skills.

This paper therefore posits that, besides learning English for General Academic Purposes (EGAP), students of Science and Technology and Engineering based disciplines should be exposed to English for Specific Academic Purposes (ESAP). EGAP has to do with the teaching of the language system, that is, the grammar and other linguistic features of the language

system, whereas ESAP is based on the pragmatics of the language, that is, what the language user does with the language in a particular context of use. It advocates the teaching of the language structure, vocabulary and the information packaging strategies required for the expression of the rhetorics of the particular discipline it serves. In this study, the focus is on English for Science and Technology (EST)/Technical English (TE). It examines those functional language requirements of the Science and Technology, needed by the student to operate within his academic and Professional domain. The teaching of English for Scientific and Technological/Technical Purposes as a specialized activity is today viewed as an increasingly growing and important arm of Teaching English as a Second Language (TESL).

English for Science and Technology

Dudley-Evans and St John (1998) argue that, English for Science and Technology has been the main thrust of English for Specific Academic Purposes. EST is English for Scientists, technologists, engineers, needing English to function in their various areas of specialization. Trimble (1990) defines EST as English that covers the areas of English written for Academic and Professional Purposes, which includes the often informally written discourse found in trade journals and scientific and technical materials written for the layman. The analysis of Close (1962), advances three stages of Scientific/Technical English. The first is the foundation stage, which provides the student with the normal English course – the General English course. The second is the superstructure directed towards general Scientific/Technological Purposes. This stage is provided at the first year University, Polytechnic or colleges of Technology Education. This can be described as the intermediate level. The third stage is the later superstructure, designed for advanced

Scientific/Technological Purposes. Thus English Language Teaching in Nigerian Polytechnics should be designed to combine both General English and English for Science and Technology stemming from English for Specific Educational Purposes. Onyemachi (2015) identified the following syntactic features of Scientific English as characteristic of the discourse patterns of National Diploma students of the Food Science and Technology department of Akanulbiam Federal Polytechnic, Unwana; passivisation, comparison and contrast, syntactic negation, fronting, compounding, formulas and symbols, exemplification, infinitization, syntactic emphaser, etc. Apart from the already examined rhetorical functions and techniques, the discourse of science and technology also displays the usage of Scientific and Technical (Sci-tech) terminologies which need to be mastered by the student of science and technology. These Sci-tech terminologies belong to a system of terms reflecting mutually related concepts of particular Science and Technology field. In a related study, Onyemachi (2016) examined competency requirements of Polytechnic Engineering students in Scientific/Technical Communication and identified the following rhetorical needs: resuming, defining, describing, instructing, classifying, causality and effects, time and space order etc., among others. In all of the studies reviewed, it is implied that students of Science Technology and Engineering have special needs in English for the processing of their academic and professional discourse, particularly in their scientific/technical communication.

Learner-Centered Education

Learner-Centered Education (LCE) focuses on each student's individual needs. According to Rao (2014) the learner-centered approach is fundamentally useful to the EST teachers, as it affords students of Engineering and Technology the benefit of

accomplishing their language needs, since in the approach language is taught according to the needs of the learner. Dudley-Evans and St John (1998) characterize English for Specific Purposes as Language teaching designed to meet the specific needs of the learner in his discipline, through employing effective teaching methodologies and teaching activities.

Needs Analysis

Needs Analysis is described as a technique for collecting information about the learning situation and the learners. Sasidharan (2012) defines Needs Analysis as a process of determining the needs for which a learner or group of learners require a language, and arranging the needs according to their priorities. Richterich and Chancerol (1977) refer to Needs as students' study or job requirements, that is , what the students ought to be able to do at the end of their language course. Siddiqi (1998) interprets Needs as "Lacks", that is, what the students do not know or cannot do in English. Hutchinson and Waters (1987) opine that it is imperative to determine the specific reasons for learning the language. Robinson (1991) states that Needs Analysis specifies exactly what the students need to achieve through the medium of English.

Statement of the Problem

Current advances in the globalized context of science and technology, and innovations in industrialization underscores the need to improve communication skills and English language proficiency of our students, in scientific and technological/technical discourse. There is a growing concern today, arising from reports coming from employers of labour in Nigeria that there are lacunas/gaps between the skills our students are graduating with and the communication skills required by the world of work outside the classroom. These set

of graduates are conceived to be lacking competency in English, communication and presentation skills, technical writing skills and professional speaking skills. Such lack of employability skills affect both their opportunities to be engaged after interviews and also their performance in the workplace context. This study argues that in order to facilitate learning and meet the emerging and latest trends in the field of Science and Technology, the syllabus of courses in English language should be made to suit particular language requirements/needs of those engaged in S & T, to ensure that language teaching objectives meet the demands of the society which they serve. This is also the position of Long (2005) where he insists that instead of one-size-fits-for-all approach as in the General Studies (GNS) English courses in the present NBTE syllabus, it is more desirable to view every course as involving a specific purpose with its characteristic linguistic/communicative skills.

Objectives of the Study

1. To identify the communication needs of Nigerian Polytechnic Science and Technology students;
2. To ascertain how far the prescribed course fulfils the academic and professional needs of the students.

Significance of the study

To the best of the researcher's knowledge, not many studies have been conducted to explore the needs and competency requirements of Nigerian Polytechnic students, in Scientific/Technological Communication. Most past studies have focused on their General English competency. English language comprises both content and process skills, and so requires the learners to be exposed to a more pragmatic approach to English as a Second Language, to achieve fruitful results. Considering the high expectations of the competitive

industry today, it has become necessary to revisit the Use of English and Communication courses, in order to ensure the acquisition of the appropriate language competencies that will pace up with the latest advances in S & T. In this respect, the study is important in revealing those communication and proficiency language skills required by S & T students for the processing of information in their academic and professional fields.

Limitation of the Study

The instrument for this study is limited to questionnaire survey. The findings of the study are also limited to on-the-ground situation in Science and Technology schools in Akanulbiam Federal Polytechnic Unwana, Nigeria; so the results cannot be fully generalized.

Methodology and Instruments for Data Collection

The study being exploratory by nature, the methods of Content Analysis and Survey Technique following an eclectic method of analysis were adopted.

i. Content Analysis

A content analysis of the National Board for Technical Education(NBTE) syllabus for Nigerian Polytechnics in General Studies (GNS) Use of English and Communication in English and Research Methodology was made. Apart from this, informal interactions and interviews with Subject Teachers of Science and Technology disciplines and GNS course teachers were conducted.

ii. Needs survey

Structured questionnaire on Needs Analysis was administered to students of Science and Technology disciplines of Food Science

and Technology, Science Laboratory Technology, Maths and Statistics, Computer Science, Ceramics and Glass Technology, Engineering and Building Technology departments of Akanuibiam Federal Polytechnic, Unwana, Afikpo. These consisted of ten items targeted at identifying the English Language needs in their Science and Technology and Engineering fields. The objective of the questionnaire was to identify the gaps in the existing syllabus design vis-à-vis the academic and professional needs of students. With all these and based on the researcher's experience of teaching English to Polytechnic students for over twenty years, a set of needs-based skills were evolved.

Validation of the Students' Questionnaire

1. The students were well oriented on how to fill the questionnaire;
2. The students were informed not to write their registration numbers or their names, and were assured that their responses would be kept strictly confidential;
3. The researcher interacted with the students to clarify any area of non-comprehension and resolve any problems they encountered in filling out the questionnaire.

Interviews and Interactions

In order to validate the needs/requirements identified, observations and opinions of practicing S &T teachers and GNS courses teachers were sought. Reactions from the interviews indicated that there were obvious lacunas in the GNS English syllabus and English Language Teaching which need to be addressed, in order to adequately cater for the communication needs of students of Science and Engineering Technology.

Data Analysis/Major Findings and Discussions

The two-page questionnaires were distributed personally by the researcher to students and the students participated fully in the questionnaire survey. The data collected from the questionnaires were analysed as a percentile of the respondents.

Observed Rankings of Students' Academic/Professional Needs

S/ N	Issues	Yes	No	Undecided
1	Aware of the special features of English for Science and Technology like; the aspects of objectivity, use of impersonal language, passivisation, precision, resuming, directness, etc.	7	83	—
2	Agree that General English should be done hand in hand with English for Science and Technology/Technical English.	80	20	—
3	Sensitized to basic language skills like listening and taking notes, identifying the topic of the lecture, listening to long and short conversations etc?	45	50	5
4	Competent in speaking skills specific to student's field as: describing/explaining/defining/classifying objects, etc.	5	90	5
5	Sensitized to reading skills in Scientific/Technical English texts as: predicting, inferring and guessing meanings.	20	80	—
6	Acquired professional speaking skills as: professional presentation skills, seminars, group discussions, interviews, etc.	33	67	—

7	Competent in writing skills in Scientific and Technical English like: definition of technical terms, description, enumeration, process time order, specific time order, space order, comparison and contrast, causality and result, logical patterns, narration, argument, instructions, directness, etc.	8	92	—
8	Sensitized to special grammar items in Scientific/Technical Communication as: modal auxiliaries in Technical writing, conditional structures, connectives, dynamic verbs, etc.	15	85	—
9	Possess competence in professional writing skills like: Transcoding, Physical and Conceptual paragraph organization, Business letters, Technical Reports, Proposals, etc.	7	90	3
10	Convinced they are receiving enough exposure in English Language and Communication skills to ensure readiness for demands of education and employability in the areas of Scientific and Technological/Technical advancement.	20	80	—

General Needs Required by the Polytechnic Students of Science and Technology

1	Need skills in the special features of English for Science and Technology/Technical English like: the aspects of objectivity, use of impersonal language, passivization, precision, resuming, directness, etc.
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2	Need basic language skills like listening and taking notes, identifying the topic of the lecture, listening to long and short conversations.
3	Need competence in speaking skills specific to their discipline as describing/explaining/defining/classifying objects, etc.
4	Need General English to be taught in conjunction with English for Science and Technology/Technical English.
5	Need sensitization to reading skills in Scientific/Technical English texts as predicting, inferring, guessing meanings etc.
6	Need Professional speaking skills as: Professional presentation skills, seminars, group discussions, interviews, etc.
7	Need competence in writing skills in Scientific and Technical English like: definition of technical terms, description, enumeration, process time order, comparison and contrast, causality and result, logical patterns, narration, argument, instructions, directness, etc.
8	Need to be sensitized to special grammar items in Scientific /Technical Communication as modal auxiliaries in Technical writing, conditional structures, connectives, dynamic verbs etc.
9	Need competence in professional writing skills as: Transcoding, Physical and conceptual paragraph organization, Business letters, Technical Report, Proposals, etc.
10	Need enough exposure to English language and communication skills to ensure readiness for demands of Scientific/Technical advancement in education and employability.

Conclusions and Recommendations

The Needs Assessment of the Science and Technology and Engineering students, reveals obvious lacks in their academic and professional communication requirements. In almost all the

issues of language related needs identified, the main focus appears to be on Scientific/Technical Communication and Scientific/Technical writing needs. The students expressed various academic needs in their specific language learning contexts similar to the findings of Onyemachi (2016), where the competency requirements of students of Engineering Technology in Scientific/Technical communication were x-rayed. From students' responses to language issues in the questionnaire, it was evident that more has to be done to equip students with the proper communication skills in Scientific/Technical Communication, as this constitutes one of the important goals of their communicative English course.

The examination of the existing English syllabus for use of English and Communication Skills reveals that the syllabus requires to be reconstructed based on the communicative needs of the students of Science and Technology and Engineering Technology; as various gaps were noted in the capture of some characteristic communication skills required by learners.

The study suggests a need for interaction of teachers of English with GNS English syllabus designers, in order to capture features that would match students' academic and professional needs; bearing in mind that the aim is also to promote and optimize our graduates' language capabilities. This will enhance their chances in the highly competitive milieu of the labour market. The study also suggests that efforts should be geared towards the training and development of more English for Science and Technology teachers, who would possess competence both at the linguistic content and EST pedagogical levels of English Language Teaching. This in turn will help the course designers to achieve the goals and objectives of setting up the Use of English and Communication Skills courses.

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