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English for Science and Technology Courses at the University of Nis, Serbia

Abstract: The aim of this paper is to present the specifics of teaching English for Science and Technology courses at one of the most prominent state universities in Serbia, the University of Niš. We shall describe the development of those courses for students at the Faculty of Electronic Engineering and the Faculty of Civil Engineering and Architecture. We shall emphasise all the major endeavours in that respect, being fully aware that these are not only Serbia specifics. We shall present our experience and the research we had to establish in order first to conceptualise the course, and then teach it, the process of compiling and making teaching material, evaluating both the students and our own work. We shall reveal that English for Science and Technology courses proposed at universities can make the grounds for the students' future job purposes but they are not sufficient to account for the specific job requirements of individual engineers.

Key words: English for Science and Technolgy courses, state university, Faculty of Electronic Engineering, Faculty of Civil Engineering and Architecture

Introduction

We shall here present our experience and the research we had to establish in order first to conceptualise the foreign language course, and then teach it. We shall present the situation at the state university in Serbia, the University of Niš. This university comprises thirteen faculties, among them, the Faculty of Electronic Engineering and the Faculty of Civil Engineering and Architecture.

At these faculties there are four subjects dealing with English. The first two years of study have optional courses of General English. In the years three and four there is English for Science and Technology I, and English for Science and Technology II, and they are obligatory. According to Dudley-Evans & St. John (1998) [1] English for Specific Purposes (ESP) should be offered at an intermediate or advanced level.

As English is accepted as a lingua franca [2] many learners of English want to learn the language specifically in their special fields. Thus, the demand for ESP is growing rapidly.

Students learn English not for the sake of it, but because they need to use it. They are aware of the fact that English, as a global language [3], is important in order to communicate and to perform job-related functions.

Course design

The experience of planning and designing an appropriate course that suits target ESP groups can be very challenging, especially for new instructors. ESP instructors of such target groups are often faced with various complexities and problems when they lack the know-how of designing effective courses that will cover the specific language needs of their students.

In the first and second year of study there is offered an optional subject – General English. Those two courses are GE for beginners, and GE for students who are at the intermediate level of English language fluency. These are utterly specific courses for these faculties. Students have absolutely no obligations in terms of passing exams or any other duty. These courses have been designed and

implemented solely to help students either learn English from the beginning, for we still have students who did not have English language instruction in their previous education, or to help those whose knowledge is insufficient for the instruction of English that is to deal with scientific discourse.

In the years three and four there is English for Science and Technology I, and English for Science and Technology II.

It needs to be noted that students know full well how much they, as future engineers of Electronics, Telecommunications, Information Technologies [4], as well as future engineers of Structural Engineering, Hydraulic Engineering, Traffic Engineering and Architecture, are going to need English language. At the same time, they do know that having private instruction outside the faculty has the price that is not easily acceptable with all the costs that studying requires. Therefore, they are eager to attend those classes.

They are designed primarily to help them upgrade their knowledge. Because of that, it can be said that year after year the courses are different. This is due to the needs analysis that is carried on prior to the commencement of the courses. It is done in an informal way. Once the students and the lecturer gather for the first time in the semester, that is an introductory class meant for them to get to know one another. First the lecturer introduces herself, explains about the course design and purpose, explains why the absence of all duties. Then, students are invited to talk about themselves. Here, the lecturer gathers all the necessary pieces of information needed for making the outline of the course content.

General English vs. English for Science and Technology

The concept of ESP significantly differs from the concept of learning General English General English **[5]** includes short texts for further re-arranging, newspaper articles, authentic TV programmes and advertisements, timetables, forms, dictionary items, sets of Cambridge Exams Practice textbooks, articles on British popular press, vocabulary, etc.

English for Science and Technology includes specialized coursebooks, specialized articles from professional journals, information articles on new products, graphs, charts, texts downloaded from the Internet and other authentic materials. Students are encouraged to suggest topics they would enjoy reading about or bring in their own interesting texts.

The content will further be conceptualised literally after each class as a preparation for the next. The lecturer designs the course so as to fit the needs and gaps in knowledge that are recognised in students and by themselves. The content also bears modifications during the preparations for each class. These are classes of General English, and the content deals with a wide variety of topics. It is the effort on the part of the teacher to use the freedom that these two subjects imply, and present students with topics and texts that are of their interest as they expressed it. For the lecturer, this means that she has to prepare original class material for each week, year in, year out. Yet, it is no hardship, as this is a certified way of engaging students' attention and motivation [6]. The responsibility of the teacher for making students like English language classes is immense. On one side this is because they do need English. English is learned not just as a subject but also for service [7]. It means that they learn English not only for the sake of learning, but for academic purposes. On the other, those students and that teacher are to work together for four years. Unless mutual rapport is built immediately and nourished, the outcome would certainly be unsatisfactory, and more importantly, students would be denied the knowledge they so much need.

Students who previously had no formal instruction in English in their schools do possess some knowledge due to exposure to this English that is a reality. Learners know instinctively how to communicate; what they do not have, but need as non-native speakers, is the language to do so effectively [8]. With them, however, it is necessary to formalise this haphazard knowledge into meaningful and recognisable, first of all, grammatical units.

Robinson [9] emphasizes the importance of needs analysis to design a language course. Responding closely to students' needs [10], these classes do not differ much from 'usual' classes of General English. Students are taught basic skills: reading, listening, translating, conversation skills, writing. As Brown [11] points out, all these five aspects must work together for the successful communication to take place.

The Faculties possess well equipped classrooms, there is a laptop and video beam facility and the wireless Internet. Mackay [12] takes into consideration, when assessing students, students' attitudes and behaviour, conditions under which they study, and the equipment used.

According to the job description, an engineer must possess three competencies: technical knowledge, professionalism and management skills. While studying ESP course, students have the opportunity to demonstrate them: meeting an oversea visitor at the plant, the explanation of a business plan of his staying, discussion of innovative processes and methods in modern production, the specific features of working with modern materials. Engineers should know how to organize the process of production, its stages. The ESP course implies an approach to English language teaching which aims to meet the needs of our technical students taking into consideration the peculiarities of the Aerospace

English for Science and Technology I

English for Science and Technology I covers topics that would be of use in the students' future occupational positions. This relates to the content and topics covered, bearing in mind that many of the jobs today do follow the trend of contemporary science – that of being multidisciplinary.

In order to comply with the general profile of the Faculties, and following the premises of Content Language Learning, the first part of this course contains material that can be termed as reflecting the general technical knowledge that every engineer, regardless of his or her specialisation should possess. This reflects the structure of the studies offered at the Faculties, namely, the first year offer courses that are common for all students, only in the second do they choose modules and split into different groups studying different subjects. The first year is the basis for specialised studies that follow. In the same way, the first part of the subject English I serves as a basis of General Technical English that is to be followed by more specialised part dealing directly with the specific orientation of each module.

So it came as logical to almost literally have content in English that is parallel with the content taught in major subjects. Therefore, much of the material deals with Mathematics, Physics, Basics of Electronics, Electronic Components, and History of Civil Engineering and Architecture, Construction Technology and Organisation.

The next part of this subject, as already explained, targets more specific areas of expertise. Subject English I has for its aim to instruct students basic relevant vocabulary, typical syntax structures for these sciences, most present grammar units, morphology that reveals most frequent ways of word formation in this area where the occurrence of new words is an every day phenomenon. The topics that are covered are of the following types: Computer architecture, Electronic Components, Cell Phones, Power Generators, Information Society, as well as Constructions, Materials, Urban Development, Roads, Railways, etc.

The grammatical, morphological and syntactical structure units that were found to be relevant and highly used in English taught at this faculty are the following: Verbal Tenses, Passive Voice, If clauses, Derivatives, prefixation and suffixation as the most common word formation morphological process present in the discourse of the relevant sciences, Comparison of adjectives, Comparison and contrast sentence structures with appropriate signposting vocabulary.

Classes are of two types according to the curriculum of the Faculties: lectures and practice work. However, due to the specific nature of language classes, these two are never clear cut or straightforward. Before each class students are told the topic of the next class, asked to think about that topic, remind themselves of what they already know about it or do some research. Conversation on the given topic both precedes and follows reading the relevant texts. Before introducing the students with the text, they are to say what they know about it, afterwards they are to compare the information they have with that presented in the reading material, and to give comments on for example whether this is above their level of understanding the issue, or completely familiar. This is the time when they engage in individual presentations or elaborations, and in mutual discussions. The lecturers occasionally step in so as to direct the flow of the conversation.

The material is comprised of that of world renowned publishers who have books on English for Science and Technology, the latest journal articles from the most relevant publishing houses of this area of science, and the material made by the lecturers.

The methodology of presenting the aforementioned grammatical, morphological, and syntactical categories is always deductive. The reading material is carefully chosen as it contains obvious and explicit examples of these. After the discussion students are asked to observe those and deduce the rules of their formation and use. This is followed by presenting the students with appropriate exercises that help them pinpoint this type of language awareness.

Students are given homework, usually in the form of completing an exercise. They send it via email. Final exam consists of two parts, written test which reflects all the reading material and exercises done during the course, and whose successful completion is the precondition for being invited to an oral part of the exam. During this exam students are first required to present satisfactory reading and translating of the familiar texts, to talk about the topics covered during the course, then converse with the lecturer on those topics. If this is all successfully covered, the student is asked to talk about himself/herself. Finally, if promising, the student is given an unknown text to read, translate, comment on it.

The communicative task

We have entered a period in which language and communication play a central role than ever before in every aspect of human life. This suggests a global use of language. Here, the focus is on the role of the communicative foreign language teaching/learning. Generally speaking, students of engineering need a specific set of language skills for their success in education and career.

When students start dealing with English for Science and Technology I, they are very often completely different in their readiness and openness to talk. The communicative task is a piece of classroom work which involves learners in comprehending, manipulating, producing or interacting in the target language [13]. This major change happens as there is a sharp discrepancy between instruction in their major and instruction in foreign language. This happens as most, the greatest number of classes they attend, are performed in such a way, that they are not asked to say anything, literally. They either listen to lectures, passively, take notes and then leave the classroom, or have laboratory practice where again they are just to do something, not talk about it.

This is an extreme situation. Once on obligatory English classes, when asked to talk, either to engage in the teaching material presented and practice it, or invited to some small talk, before or after the class, they simply close. On more than numerous situations, the co-author of this text tried to discuss this issue with them. They identify the cause easily – they are almost

never asked to talk in all other classes. This is first noted to an astounding degree when these obligatory classes begin. Immediately at first classes students open their laptops or netbooks to take notes, without first listening to the teacher and trying to understand what is being presented to them, to take notes afterwards. It is our belief, although we have no expert knowledge in psychology to rely on, that the change in the situation, now classes being obligatory, makes them completely change their approach. And they change for the worse.
Their stiffness in communication (for the majority of them) lasts all the way through teaching both subjects, English I and II. Once they have passed the exam successfully, they come to the office from time to time to have a chat. They seem to have a need to say that they have achieved some success, to simply say hello, etc. Sometimes, when they leave the faculty, get a job, often in another town or country, they write an occasional email for the same purpose. This again is a much rewarding situation for the teacher.
Yet, as language professionals, we find this contrast between instructions in their major and English a most unjustifiable situation to be found in an educational institution.

English for Science and Technology II

The primary goal of the subject English for Science and Technology II is to teach students the stylistics of the discourse of Science and Technology. The stylistics is needed for students of Science and Technology because they interact both at personal and professional level. This is done through presenting students with the principles of written and spoken communications in English for Science and Technology. The aim is for the students to learn the structure of various kinds of communications and the appropriate style of speech.
First, they are explained that learning the principles of written and spoken presentations in English [14] is done with the ultimate purpose of better communicating scientific and professional knowledge to other professionals but also nonspecialists. The principles of presentation [15] considered here are based on *the scientific method of research*. If those are consistently applied, the scientific content that is presented will be better comprehended, analysed and critically examined.
For this subject to be fully successful, the lecturer finds it necessary for the students to fully comprehend that academic and professional communication skills are more important than ever in today's competitive world, and that for most professionals, writing reports, letters, memos, or speaking to various kinds of audience and in various situations, will nearly be an everyday occurrence. But first of all, getting a job is often a difficult task, as they are aware. An effective resume should promote them well enough. Once they get a job, they will soon realise that professionals are communicators. After performing an analysis or a design, the practicing professional must somehow communicate the results of their work to others. These 'others' might be a supervisor, a fellow colleague, a client, a government agency, or general public. According to the Society for Technical Communication (STC), Academic and professional communication involves analysing and distributing scientific and technical information efficiently and accurately for specific audiences. Students will learn how to choose an appropriate topic, create effective visuals, and design a speech opening [16].
Designing effective presentation requires insightful and well-trained thinking strategies that can produce clarity in communication without oversimplifying scientific issues. The results are substantive, not merely cosmetic: improving the quality of presentation actually improves the quality of thought and vice versa. This is the crucial point in teaching this course, the profound rationale for its existence in this form.

The fundamental purpose of scientific discourse is not mere presentation of information and thought, but rather its actual communication [17].

The content that the authors want to convey is inseparable from the form they employ. With that as an aim students need always to bear in mind that readers do not simply read, but interpret. Information is interpreted more easily and more uniformly if placed where most readers expect to find it. These needs and expectations of readers affect the interpretation not only of tables and illustrations but also of prose itself. Readers have relatively fixed expectations about where in the structure of prose they will encounter particular items. If students can become consciously aware of these locations, they can better control the degrees of recognition and emphasis a reader will give to the various pieces of information being presented. For that reason, teaching principles of academic and professional presentation focuses on teaching the structure of various types of presentation.

A talk should not be a monologue, but a dialogue in which more than just verbal communication is involved [18]. To communicate means to understand, so students are taught to think of their audience and look at them as their reactions will direct them on the spot.

Practice work is done consequently. Students are given time between two classes to prepare a presentation. Presentations demonstrate one of the most succesful way 'to get the student's attention, encourage curiosity, create challenges, provide satisfaction' [19]. In order for students to further adopt those principles, they are encouraged to deliver a spoken presentation [20]. They are allotted time to prepare, given freedom to choose the topic and think of an imaginary situation in which the presentation presumably takes place. The actual presentations are incredibly diverse in topics and forms. They deliver it in front of a class. It is upon them to choose who they will 'impersonate', whether an expert asking a board of executives to fund their project, or someone teaching high school pupils, or somebody else. Students are made aware how important it is for them to fully use this opportunity to practice oral presentations as very soon, when they graduate from the faculty, they will have to actually do it. Once they come out in front of the board, they do admit, in most cases, that this simulation, the very coming to a physically different position changes everything. It happens often, that a student otherwise an open and self confident personality, would feel shy and insecure. They admit it and then truly feel grateful for using this opportunity for practicing. Of course, they are to make power point presentations, and they gladly do it, investing all their knowledge gained into making effective presentations. After they finish their delivery, everyone in the classroom is asked to join in the discussion on what we have all just witnessed. This happens to be the most useful part in this practice work for both the student presenter and the other students. It is a free flow conversation, a friendly exchange of impressions and opinions. In this way, they come to profound insights into such matters as to how one should behave, stand, talk, keep their body, what voice tone should be used, and the like.

Conclusion

To sum up, this paper provides a short analysis of the development and the design of ESP courses at university level. The aim of this report is to present the specifics of teaching/learning ESP at a state university in Serbia, the University of Niš. Our intention was to describe the development of ESP courses for students from the Faculty of Electronic Engineering and the Faculty of Civil Engineering and Architecture.

New demands on the curriculum of English language teaching/learning have been arisen. It has been realized that teaching/learning of General English cannot match the needs of the new labour market. So, the aim is to empower students to use language in a target professional situation. Language content thus presented consists of profession specific vocabulary that characterizes word formation in that area of expertise and appropriate style.

The concept of ESP significantly differs from the concept of learning a language, let us call it General English. Teaching ESP is a pragmatic and classroom-focused task, with constant assessment of performance which needs to be accurate and measurable. This is because it is a preparation for future competition of students, through which they achieve communicative competence needed for the

profession they study for. It is prescribed by form. On the other hand, learning a language with a broader aim in mind, is an ontological skill. It represents a sort of learning about the whole social world. Unlike the preparation for a life in a competitive global economy, it is an open and collective exploration and exchange of experiences and ideas; it helps form a critical and intercultural being.

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