Proceedings

English for Specific Purposes in the Context of the Shifting Educational Paradigm Triggered by Industry 4.0 †

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Abstract: The paper proposes a model for a prospective approach to the study of the English language for engineering students. This model is influenced and shaped by the consideration of the necessity of educating engineering students for the realities of Industry 4.0. Given the dramatically changing paradigm of language teaching and language teaching aims, a critical selection on the part of the teacher is indispensable when it comes to choosing the most adequate teaching resources. The paper includes theoretical and practical suggestions to approach the ESP (English for Specific Purposes) seminar, which can lead to the improvement and fine-tuning of students' skills and attitudes in view of Industry 4.0 realities.

Keywords: English for Specific Purposes; Education 4.0; soft skills; oral communication; language education

1. Context: Industry 4.0 and Education 4.0

The huge technological advancements brought to humankind by Industry 4.0 cannot overlook any major sector of our world. The educational domain is definitely marked, reshaped, and influenced by these tremendous changes. "Education 4.0" is the umbrella term that encompasses the changes which educational systems must undergo to align with these technological changes. The reconfiguration of the role of education is natural under these circumstances; all great changes in human society—including all previous industrial revolutions—are bound to affect the sector responsible for education. Young generations must be educated in accordance with the new set of values brought about by industrial changes; they must develop, and exercise skills and aptitudes required by shifting technological realities. Lack of correlation between educational policies and objectives and the technological reality in which students will act leads to poor results, inability to adjust and fulfill obligations, and eventually professional failure.

The correlation between the 4th industrial revolution and education is approached in various studies. Bernard Marr [1] identifies a list of requirements that should be implemented in schools to prepare students for contemporary technological advancements. These requirements are a redefinition of the purpose of education, the improvement in STEM (science, technology, engineering, math) education, the development of human potential, the implementation of lifelong learning models, the alteration of education training, the transformation of schools into makerspaces, international mindfulness, and changes in higher education. Similarly, Brian E. Penprase holds that the 4th industrial revolution will affect deep changes in the way education is perceived and will trigger the necessity of more creative individuals, with an emphasis on collaborative work, interconnectivity,

interdisciplinarity, and deep intercultural understanding [2]. Self-directed learning and thinking, ethical thinking, intercultural awareness, critical thinking, and students' empowerment in the view of accomplishing their full potential are also trends favored by the new approach to education triggered by Industry 4.0. These are all commonly perceived as critical elements in students' ability to efficiently apply their knowledge in the technological world in rapid, unprecedented expansion. These new requirements bring about inevitable curricular changes. Schools must adapt to the realities of the day to produce well-informed and well-trained specialists.

Consequently, the concept of Career and Technical Education (CTE) has become increasingly popular, its main objective being that of providing students with specific tech-based and career-oriented skills. Within this framework, the emphasis is placed on developing human potential, boosting students' creativity, and the practice of soft skills, which are considered to be the essential elements to prepare students for the realities of the Industry 4.0 workplace [3].

Additionally, another way in which modern education may respond adequately to the challenges posed by Industry 4.0 represents the resort to hybrid teaching, combining online and on-site instruction. Blended learning, flipped courses, BYOD ("bring your own device") in the classroom, online activities may constitute more efficient learning tools, preparing students for the diversity of technological resources in contemporary workplaces. The current sanitary situation which humanity is currently facing has been a mere catalyst of an otherwise inevitable shift to modern, integrated, interconnected teaching resources.

Personalized learning is another feature of Education 4.0. With the huge amounts of information made possible by technology, mass learning is no longer the right technique for a generation characterized by intense heterogeneity in terms of knowledge and information. Therefore, education needs to be more and more a personal topic. Tailor-making learning objectives, techniques, and methods is an appropriate way of respecting individual differences and potential and taking them to a higher level.

Another educational priority imposed by Industry 4.0 in education is project-based learning. Learning information by heart and assimilating theory without practice does not work in the context of our technologically dominated world where every little thing is part of a larger practical concept. Schools will have to adapt this model and prepare students to learn by doing. Besides the practical value of such an approach, projects are also useful in learning organizational skills, management skills, collaborative skills—all fundamental aspects of a successful professional.

That education must change is beyond question. Such a huge technological revolution as Industry 4.0 ineluctably affects every aspect of human life, just as the other three revolutions which preceded it. In terms of education, we cannot teach students like in the past for a future that is so tremendously different. New types of professionals are needed, ones who are digitally literate, open to sudden change, versatile to perform tasks that appear overnight. Educational institutions must take this into account and align with this rapid technological development. "Education 4.0" is a concept derived from this necessity of alignment. The products of this new approach to education will enable people to explore the new possibilities of our modern times.

2. Industry 4.0 and English for Specific Purposes

2.1. Background: Towards a New Approach to Teaching English

To what extent can the features above be served in the context of English language education in universities? Professional communication is an important part in this respect. Students' fluency in a foreign language is essential in a world where the utilization of technology relies heavily on English language knowledge. Moreover, English language classes can help students develop inter-communication skills, technology literacy, and form positive attitudes regarding group dynamics through repeated practice.

To teach English for Specific Purposes in line with the requirements of Industry 4.0, an emphasis on soft skills is the right approach. Taking into account all the conditions presented above, triggered by

the new industrial revolution which we are part of, English teachers should essentially reconsider their role. We are no longer providers of information; this is so easily accessible nowadays. English grammar or technical vocabulary and the discrete point exercises practicing them in the language class are now rendered obsolete by the new realities: endless glossaries of extremely specific terminology, grammar explanations, and online translation tools at the tip of anyone's little finger. The traditional 'handout-based' approach is useless when there are huge resources of online material of the most diverse types. The once-fashionable emphasis on the traditional language skills and the adjacent subskills is only a good starting point, and a means to a higher end.

Which is then this higher end? Which should be the better approach for teaching English for Specific Purposes to students who will be full-time actors on the stage directed according to the requirements of Industry 4.0? In a world of interconnectivity, fast race technological developments, cyber-physical systems, and artificial intelligence, which is the role of English language seminars?

Besides the obvious answer that an interconnected world needs communication and English has the status of the universal language, the analysis goes deeper than this. In light of their specificity, English language seminars may have the objective of developing soft skills and attitudes. Soft skills may be defined as "character traits, attitudes, and behaviors rather than technical aptitude or knowledge, [. . .] intangible, non-technical, personality-specific skills that determine one's strength as a leader, facilitator, mediator and negotiator" [4].

The specific activities aimed at developing professional communicative competence can, therefore, achieve other objectives: They may be the opportunity for students to develop critical thinking, to express and defend opinions, to negotiate, to think creatively, to develop independent working routines, to collaborate, to work in groups, to reach agreement, to boost their versatile capacities and lower their resistance to change, to perform information transfer, to speak in public, to present professional information. These are but a few of the conditions which are expected from future employees if they are to perform successfully in a world dominated to a greater and greater extent by the philosophy behind the concept of Industry 4.0.

These educational scopes are recognized by many authors. Chamorro-Premuzic, among others, asserts the necessity that universities should implement "a set of non-academic attributes, such as the ability to cooperate, communicate and solve problems, often referred to as generic or soft skills in higher education", due to the fact that "unlike academic or disciplinary knowledge, which is subject-based, content-specific and formally assessed, soft skills comprise a range of competencies that are independent of, albeit often developed by formal curricula and rarely assessed explicitly" [5].

2.2. A Questionnaire Testing Student Perception

Whenever changes are to be implemented, it is important to have a complete overview of all the stakeholders involved in the process. In the concrete case of any attempt to improve the outcomes of English language seminars for Engineering students, it is important to have an analysis of students' perceptions. Students are great and objective observers when it comes to course evaluation; they are perfectly capable of identifying their learning needs, their strong points, and deficiencies. Moreover, they are sometimes more connected to technical and professional realities than teachers are. They are "digital natives", while teachers are "digital immigrants" [6]. A reconsideration of the grounds on which teachers should reshape English language seminars should consider students' feedback as an essential factor.

To find an answer to the questions above, we applied a questionnaire to 1st- and 2nd-year students within the Department of Electrical Engineering and Information Technology (specializations: Automation and Medical Engineering) from "G.E. Palade" University of Medicine, Pharmacy, Sciences and Technology in Targu Mures, Romania. The questionnaire was applied in March 2020. During the previous semester, I attempted to include principles inspired by the requirements of Industry 4.0 presented above. This new approach included a predominant emphasis on oral communication and public speaking on a variety of topics, a greater resort to technology in the teaching

process (by using a lot of educational websites and applications, but also by using genuine online resources as teaching material), project-based assessment, peer assessment, self-assessment, blended learning, information transfer exercises, oral presentations, building effective visual support, debates, group work, teamwork, role-play, flipped classroom, etc.

The questionnaire consisted of 6 questions, both closed and open-ended, and was used to obtain students' perspective, in their capacity of end-users, of the way English language seminars should be conducted so that they serve the purposes of better preparing students for real-life professional situations. The questions were the following:

1. On a scale from 1–10, assess the importance of the English language seminar as part of the general engineering curriculum.
2. Which is the most important skill/aspect of language in your learning process?

    - Grammar
    - Vocabulary;
    - Pronunciation;
    - Reading skills;
    - Listening skills;
    - Writing skills;
    - Oral communication skills;
    - Other, namely.

3. Continue the sentence: "It is important for a future engineer to learn English because . . . "
4. Continue the sentence: "What I like about studying English in university is . . . "
5. Continue the sentence: "What I dislike about studying English in university is . . . "
6. In order to be effective for engineering students and prepare us for real life, English should be taught:

    - In the traditional way, focusing on general language skills;
    - With an emphasis on technical vocabulary;
    - With an emphasis on grammatical accuracy;
    - With an emphasis on developing personal and inter-personal skills;
    - By resorting to technology as much as possible (web sites, apps, etc.);
    - Other, namely.

The questionnaire was answered anonymously by 40 students of the Faculty of Engineering. The first question is an acknowledgment of students' appreciation of the importance of the English language in the education of a future engineer, with 16 students (40%) considering that English has the highest importance.

The second question did not restrict students to only one answer; the intention of the question was to reveal to what extent students are aware of their personal priorities in terms of language acquisition. In addition, the question was intended to guide the teacher in setting the learning objectives of the future English classes so that a wider variety of learning styles are addressed. A great majority of students (95%) mentioned oral communication skills, which was the most popular answer. The next one in the order of students' preferences was language functions (40% of the answers mentioned this), writing (34%), vocabulary (28%), reading (27%), grammar (25%), pronunciation (20%), listening (16%). Two students chose "other" and wrote slightly similar answers referring to an integrated skills approach to languages.

Most of the answers to question 3 alluded to the importance of the English language in terms of finding a good job, understanding technical and other work-related documents, and keeping good interpersonal relations in the professional environment. This confirms the fact that students are aware

of the conditions needed to perform on the labor market and how the English language seminar can be the opportunity to develop essential skills, aptitudes, and attitudes. One of the students wrote that "Knowing a foreign language is essential for an engineer nowadays. We need English to communicate with our colleagues, with the clients, with suppliers. Documentation for the most modern equipment is in English, and so is all the specialized software. Most of the engineering companies are connected with the international business environment, so the knowledge of English can help our professional advancement."

Questions 4 and 5 were intended to provide objective feedback regarding the activity of the previous academic semester. Motivation is an essential factor in learning; one learns best when one is motivated to do so. It is important that the teacher know what students like doing in terms of activities, resources, patterns of interaction, assessment types, etc. Here are some of the students' answers, "I like that we focus on activities which develop our communicative abilities"; "I like that we learned and practiced how to express ourselves in public"; "It was useful for me to learn how to construct a communication strategy in English and deliver it in front of the class"; " I appreciate that we have to speak a lot, even if not everybody finds this comfortable"; "I particularly liked the online games, because I am a passionate gamer"; "I like the assessment through real-life projects instead of the typical exam"; "I enjoyed very much engaging into debates with my colleagues and the situations when we had to play roles". The negative feedback was limited. It mostly referred to situations in which some students' level of English was not good enough to enable them to understand everything. Furthermore, there were some suggestions on working more on technical vocabulary and one which would have appreciated more extensive grammar explanations. Overall, students' answers confirmed the expectation that building the course structure on criteria other than the classical ones, with a much higher emphasis on the development of personal skills, is a factor of success.

The last question had a similar purpose and students' answers confirmed this approach once more. Of the 40 students, no one thought that English should be taught in the traditional way. All of them (100%) consider that the best way to approach languages for engineering students is with an emphasis on developing personal and interpersonal skills and a vast majority (85%) agree on the importance of using technology in the classroom. Twenty students (50%) also acknowledge the importance of teaching technical vocabulary, while a smaller percentage (24%) consider that the focus on grammatical accuracy is the right approach.

3. Conclusions

The findings of the questionnaire are encouraging and helpful for the author's attempt to align the English language seminar for engineering students with the requirements imposed by Education 4.0. The feedback was overwhelmingly positive, with a few exceptions which are extremely useful for future activities. Students' answers show that they are objective assessors of their learning style and priorities and that they acknowledge the benefits of the changes in terms of language learning for their personal and professional growth.

The reform process of the English language seminars falls within the much wider range of the educational system at large. It is an ongoing process in which teachers and students alike must try and adapt to new requirements, implement new methods and resources, and assimilate updated philosophies regarding the role of education and learning. At the same time, it is a trend that cannot be reversed because progress, innovation, and development cannot be reversed either. We live in an era of extraordinary, unprecedented changes that inescapably reflect upon every single aspect of human life, and educational actors will have to adjust accordingly.

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