

A Needs Analysis Approach on Textbook Evaluation: The Case of the ESP Textbook for Mechanical Engineering Students in a Technical Vocational High School Context

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Abstract

The present paper entails research in two distinct, interrelated fields in language teaching, namely needs analysis and textbook evaluation in an ESP context. In the light of the above, it aims to provide a systematic and principled evaluation of the ESP textbook issued by the Ministry of Education for the Sector of Mechanical Engineering Technicians in Technical Vocational High Schools which is based on criteria emerging from a Needs Analysis research. A Needs Analysis research was designed involving students, discipline teachers and discipline professionals providing quantitative and qualitative evidence. This evidence informed a textbook evaluation checklist which concluded in the textbook's strengths and weaknesses. The outcomes of the study were implications and proposals on textbook adaptation made on the basis of the research evidence considering the ESP nature of the teaching context.

1. Introduction

1.1. Research Background

The current paper aims at presenting the evaluation process of the textbook used in the ESP context of a Technical Vocational High School in Greece on the basis of evaluative criteria that have emerged from a needs analysis research. A triangulated needs analysis research providing both qualitative and quantitative evidence provided the criteria upon which a textbook evaluation checklist was developed. The application of the evaluation checklist indicated the textbook's strengths and weaknesses upon which implications for textbook adaptation were developed.

1.2. Research Aims, Questions & Methodology

The research was carried out in two stages. The first stage intended to shed light to the ESP language learning needs of students attending the Second Grade of the Mechanical Engineering sector in a Technical Vocational High School in Crete as these are defined by the students themselves and by discipline specialists and professionals. The needs analysis data was then used in the second stage of the research in order to define the local evaluative criteria for the development of a textbook evaluation checklist. The research described above therefore concluded in the second stage of the research in the evaluation of the textbook proposed by the Ministry of Education for the specific teaching context. Additionally, a textbook adaptation framework considering pedagogical, methodological and teacher-development implications based on research findings was also proposed.

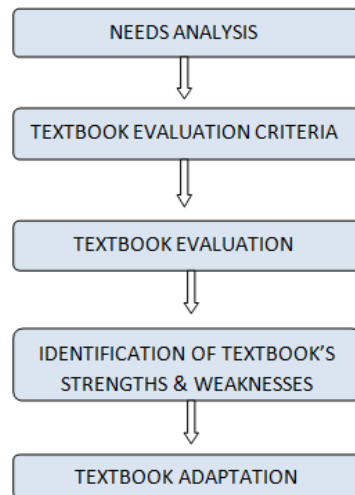


Figure 1- Schematic Representation of the Research Rationale

The research questions can be summarized as following:

1. How do Mechanical Engineering students define their language needs?
2. How are these needs defined by discipline teachers and professionals?
3. Does the current textbook address students' language needs in an effective way?
4. What are the strengths and weaknesses of the textbook proposed by the Ministry of Education regarding students' needs?
5. In what ways can the current textbook be modified in order to satisfy these needs?

A mixed method approach regarding the collection of data and analysis techniques formed the basis of the initial part of the research which involved the identification of students' needs (Dornyei, 2007).

The second part of the research involved the evaluation of the Ministry approved textbook. For that reason, a set of criteria were developed on the basis of the data collected by the needs analysis survey. After the definition of the criteria a checklist was developed in order to research the textbook potential to meet the aforementioned requirements and address students' needs effectively.

Concluding, an adaptation framework based on the evidence collected by the aforementioned research stages was proposed in order to achieve a better match between the course book and learner needs.

2. Theoretical Background

2.1 Needs Analysis in ESP

Needs analysis seems to have a particular importance in ESP language courses. As ESP programs are developed with the scope of meeting specific learner needs in order to enable them to function linguistically within a particular academic, professional or workplace environment (Basturkmen, 2018), the realization of those needs would be a key element in the design and ongoing revision of the ESP syllabus (ibid). Another reason related to the critical importance of needs analysis is related to the duration of ESP courses, which is usually short. Given the time constraint, teaching content and practices should feature high relevance to students' needs in order to be effective (ibid).

ESP Needs Analysis entails according to Rahman (2015) Target-Situation Analysis (TSA), Learning Situation Analysis (LSA), Present Situation Analysis (PSA), Means Analysis and Gap Analyses (Brown, 2016). TSA focuses on the identification of the learner's linguistic requirements in a specific academic or occupational setting (Wu & Lou, 2018) and involves language use investigation within a specific ESP discourse community (Brown, 2016). TSA also includes both target situation linguistic and learning analyses which involve the identification of the linguistic and learning features of a specific ESP community (ibid). Target needs can be further subcategorized into necessities, wants and lacks (Demarcsek, 2017). LSA considers what the learners need to do in order to learn (ibid) and involves subjective, felt as well as methodology related needs (Dudley-Evans & St. John, 1998). PSA involves the specification of students' ESP abilities at the beginning of a course (Brown, 2016), while Means Analysis which uses information on the local situation (teachers, methods, management, facilities) aims at guiding language courses to be implemented in healthy environments (Rahman, 2015). Directly related to PSA and TSA is what

Brown (2016) mentions as ‘Gap Analyses’ which make use of PSA as well as TSA evidence in order to examine the gap between what the learners need to be able to do by the end of instruction and what they are currently able to do.

2.2 Materials Development-Evaluation & Adaptation

Materials development is a field with practical underpinnings as well as an academic field of study (Tomlinson, 2018). Its practical realization involves the production, evaluation, adaptation and use of materials and as an academic field it involves the study of the theoretical principles underlying material design, production, implementation and evaluation (ibid).

According to Tomlinson (2003, as cited in McDonough et al, 2013, p.50) ‘Materials evaluation is a procedure that involves measuring the value (or potential value) of a set of learning materials’. Evaluation may serve different purposes (Rubdy, 2014) and constitutes an important professional activity for all language teachers (McDonough et al, 2013) so that it could be claimed that every teacher is a materials developer (Tomlinson, 2016).

Materials adaptation is claimed to contribute to the success of a class and may involve various procedures from methodological adaptations to simple omissions (Islam & Mares, 2014, as cited in Tomlinson, 2014). Adaptation is a practice directly related to evaluation (McDonough et al, 2013) and reflects the teacher’s striving for congruence among materials, methodology, students, course objectives, target language context and teacher’s style. The adaptation procedure involves the modification of materials content in order to be appropriate to the specific learning environment (ibid). It may involve changes to content, sequencing, format, presentation, monitoring as well as assessment (Macalister, 2016, as cited in Azarnoosh et al, 2016). While adaptation objectives may include personalization, individualization, localization and modernization in order to attain appropriateness (McDonough et al, 2013), Islam and

Mares (as cited in Tomlinson, 2014) suggest that adaptation should be carried out with the scope of offering real choice to students, exposing them to accessible and engaging language input, catering for various learning styles, promoting learner autonomy and encouraging higher-level cognitive skills.

3. Research Specifications

3.1 Participants

The main body of the needs analysis data was collected by a number of 60 students who currently attend the ESP course or attended the course during the last academic year.

Discipline teachers and professionals also contributed to the needs analysis research in order to provide data triangulation. Semi-structured interviews with 3 discipline teachers with ample experience each contributed with qualitative data in the research. Two discipline professionals who have been working as freelance car technicians in the specific area were estimated to shed light to the real professional English language needs of the students as well.

Data deriving from the application of the evaluation checklist was provided by the ESP practitioner, who is a female teacher with a total 20 years of experience in English language teaching, 10 of them in Technical Vocational Education in the specific school.

3.2 Research Instruments

The research instruments include students' questionnaire and focus groups interview questions, discipline teachers' and professionals' interview questions and the textbook evaluation checklist which was developed on Needs Analysis research findings.

4. Research Findings

4.1 Needs Analysis Findings

Regarding the skills that the students indicated as the most important, the majority of them, believe that oral speech comprehension is very important, while many of them identify the ability to communicate orally as a very useful skill. Written language production follows along with reading comprehension and technical vocabulary knowledge. Grammar knowledge, pronunciation and the use of communication strategies were also regarded important but not as important as the previous skills.

As for the students' preferences regarding the English lesson, the majority of them reported that they would like to interact with audiovisual material and a considerable number of students would like their ESP course to be implemented with CALL Methodology. Students also expressed their preference for group work, more practice in technical vocabulary and the oral skill of speaking, as well as more communicative activities.

Further examining students' preferences as regards what they would like to be included in their ESP course book, came up with interesting data. The vast majority of students refer that they would like to have a textbook containing more recent and updated material, while some of them would like their book to provide the opportunity to work with audiovisual material. Students also designated project work, Computer Assisted Learning and group work as preferable methodologies and modes of work that their book could offer and once again pointed out their preference for communicative practice in the speaking skill.

Regarding the four skills, students designate as most important the skills of reading and speaking. Reading comprehension according to students should involve the comprehension of manuals involving a high amount of technical vocabulary. Relating

their needs to the speaking skill students mentioned communicating with a customer as a possible communicative situation for them which would involve social-interactive talk as well as explaining and simplifying a mechanical function or damage. Regarding the writing skill students limited its usefulness in writing professional emails which would involve communication with customers or contacting a supplier. Students also expressed the need for high amounts of highly specific, technical vocabulary presentation and practice.

As far as methodology related issues are concerned, students referred that they would like to carry out activities with the use of videos, computers, smart phones and that they would also like to be involved in project work). It is also notable that students want a closer connection of their ESP course with their discipline subjects.

Evidence deriving from the interviews with discipline teachers was closely interrelated with the aforementioned results. Discipline teachers gave high prominence to ESP explaining that mechanical engineers could benefit from the huge amount of easily accessible information which is available in English on the internet. Referring to the skills, the reading and speaking skill were considered by the discipline teachers as highly important, narrowing down their use in reading and translating highly specific manuals and communicating in the social-interactive level with employers, colleagues and customers. The writing skill was also considered important in specific communicative situations involving professional emails. Technical vocabulary was outlined by all discipline teachers, referring that a wide knowledge of highly specific discipline related vocabulary is very important. Finally, all discipline teachers believed that cooperation between the ESP practitioner and the discipline teachers could enhance students' performance, especially in the ESP course.

Interviews with the discipline professionals involved two experienced car mechanics working in the same region. Their experience in the discipline revealed that English language knowledge is indispensable for professionals. They summed up the necessary skills for mechanical engineering technicians in reading and speaking mentioning the writing skill as well. According to their opinion, reading could involve understanding manuals and messages in diagnostic tools, while speaking could

include interaction and communication with customers especially explaining procedures, functions and damages. Writing requirements in a car mechanic's daily professional life include writing professional emails, making orders and searching for engine parts. Once again, specific technical vocabulary knowledge was emphasized as being a prerequisite for professionals of the field.

4.2 Textbook Evaluation Findings

The application of the evaluative criteria upon the textbook 'Coursebook for Mechanical Engineering Technicians' used in the specific ESP situation revealed a partial correspondence to students' needs as these were identified during the needs analysis procedure.

Drawing conclusions from the applied checklist, it can be argued that the book corresponds to learner needs in terms of including appropriate content. The book also seems to suit learners' expectations regarding ESP course books, their interests and their proficiency level.

Regarding the reading skill, the coursebook seems to satisfy the need for a sufficient number of discipline texts containing an even sufficient amount of technical vocabulary.

Additionally, speaking activities, whenever present, achieve to revise and recycle previously taught vocabulary effectively. Vocabulary is also a field where a high correspondence between learner needs and the coursebook can be observed, as the book seems to contain the right amount of vocabulary load, sufficient vocabulary practice and revision as well as a high degree of specificity in the vocabulary items. As technical vocabulary teaching and practice was a clearly articulated need expressed by students and stakeholders, it seems that correspondence to that need satisfies an essential part of the ESP course.

Despite the aforementioned correspondence to learners needs, the coursebook under evaluation seems to feature several inconsistencies relating to student needs. These

can be broadly summarized in the outdated physique of the book, the treatment of some of the skills and issues concerning methodology.

The book seems to have little potential in satisfying learners' need to include recent and updated material in their ESP course. Realizing that the discipline under study is linked to the technological advances of the last twenty years, the material contained in the book published in 2000 could be claimed that cannot offer an updated ESP experience. Moreover, the needs analysis procedure brought to light another issue which pertains to the specificity of the ESP course in relation to other discipline subjects; it seems that ESP content is more discipline specific than other subjects taught on the second grade, while it features a similar amount of specificity with subjects taught in the third grade. This would practically mean that the ESP practitioner working with the specific coursebook could be asked to teach or explain discipline specific content, as students have not been taught the specific discipline material in the other subjects.

As far as learner needs related to skills are concerned, the book partly exhibits inadequacy in satisfying learner needs in reading, as it lacks reading input of some of the commonly used genres as these were defined in the N.A. procedure. Moreover, it can be argued that the book seems weak in effectively addressing student needs in the listening and speaking skill, as these two skills are inadequately practiced throughout the chapters, while the writing skill needs also seem to be partially satisfied because the book lacks adequate relevant writing practice.

A noteworthy mismatch between the book and learner needs can be traced in the methodology adopted by the book. It seems that book activities lack the potential to enhance students' communicative ability and maximize student talk. As students expressed the need for cooperative, interactive and technology assisted methodologies, the mode of work proposed by the book leaves little room for methodologies of this type and enhances a teacher centered learning environment.

5. Implications

5.1 Textbook's Strengths & Weaknesses

Based on the evidence deriving from the application of the evaluation checklist, it seems that the main strengths of the textbook 'English for Mechanical Engineering Technicians' can be summarized in the treatment of the reading skill and the vocabulary. The following points are therefore to be considered: the reading content of the book seems to feature a satisfying degree of quantity and specificity, as the number of discipline related texts seems appropriate and the load and technical nature of the vocabulary and the vocabulary practice offered also seem that have the potential to satisfy student needs.

The above realizations can lead to the conclusion that the ESP practitioner in the specific teaching context could exploit the quantity and specificity of the reading input and the load of the vocabulary presented in the textbook and could proceed with these strong points as the foundations on which pedagogical and methodological adaptations could be implemented in order to achieve a better match with student needs.

The mismatch between the specificity of the textbook and the other discipline subjects, the outdated nature of the book and the material, the lack of sufficient speaking, listening and writing activities involving real communication, the restricted nature of the reading genres, the quantity of visual input, the focus on language practice and not language use, the teacher-centered methodology and the lack of innovative teaching methods with the use of technology can summarize the weak points of the current textbook and could guide the adaptation framework.

It seems therefore, that the challenges that the ESP practitioner would come up with in order to satisfy student needs are various and include many aspects of the teaching procedure, involving the balanced treatment of the skills, the design of activities which involve genuine language use and maximize student talk and interaction as well as the integration of new technologies.

5.2 Implications

An important implication that arose from the needs analysis research is one that could be addressed to ESP and discipline subjects course developers and is related to the match of the specificity between the ESP material and the discipline subjects' teaching content. As students mentioned, the ESP content of their textbook features a more discipline specific nature than the discipline subjects taught in the Second Grade. On the other hand, the discipline content of the ESP course seems to be included in the specialized subjects of the Third Grade, despite the fact that the curriculum does not include an ESP course on that grade. The fact that students lack the appropriate content knowledge for the ESP course could have a serious implication on the design of the ESP and discipline subjects' syllabi for the Second Grade of the specific sector in EPAL schools.

Implications on textbook adaptation involve a variety of pedagogical and methodological proposals. In order to achieve a balance among the four skills and compensate for the textbook's weaknesses, it seems that the teacher would have to create custom materials (Anthony,2018) in the case of the listening and speaking skill and adapt reading and writing activities already existing in the textbook. In the case of custom materials creation, the ESP practitioner could follow Anthony's (2018) five-stage approach which includes reviewing previous work, creating a general plan, selecting carrier content, creating explanations and exercises and evaluating materials. The selection of the carrier content specifically, could be made in collaboration with the discipline teachers after a careful study of the discipline subjects' teaching materials so as to compensate for the mismatch between the content of ESP materials and discipline teaching materials.

As the ESP practitioner would have to create custom materials regarding the speaking skill it would be useful to bear in mind that it was considered to be a very important skill to master by students and other stakeholders and as a skill where students clearly expressed their need to practice with the use of communicative activities. The above considerations could have a serious implication on the amount of speaking activities that should be designed by the teacher in order to compensate for the lack of speaking activities in the textbook and to enhance students' speaking skills. Some critical issues underlying the design of speaking materials that could be taken into consideration

involve speaking practice in a range of contexts and genres, a calibrated level of difficulty, the provision of teacher scaffolding and raising awareness of spoken discourse features (Timmis, 2022).

Students reported that they did not face difficulties with the listening skill; nevertheless the complete absence of listening activities in the current textbook and students' need to comprehend oral interactions in everyday workplace situations suggests that the ESP practitioner would have to create listening practice materials in the context of developing active listeners (Goh, 2013). Important issues to consider in the design of listening material are the balance between developing bottom-up and top-down strategies, enhancing and not just testing the listening skill and supporting learners' metacognitive strategies (Timmis, 2022). This could help students in their overall communicative competence. Moreover, considering the ESP nature of the specific context, listening input should provide practice in recognizing technical, discipline specific vocabulary in the stream of speech (Goh, 2013). This practice could foster technical vocabulary knowledge which was a skill of considerable importance for students.

Regarding the writing skill it seems that student needs are restricted to specific genres which involve formal and informal written communication in a professional setting. The contribution of the current textbook to the teaching of the writing skill is mainly limited in the presentation of model texts illustrating target genres. These model texts could provide the teacher the opportunity to use them as exemplar texts for a writing activity supplemented by language scaffolding through linguistic examples, reference materials and multimodal stimulus sources for writing (Furieux, 2022).

The treatment of the reading skill was considered to be one of the textbook's strengths; nevertheless, some considerable adaptation proposals can be made in order to achieve a better match to students' needs. First of all, as the textbook features a sufficient number of reading texts, students could be offered the option of selecting the texts themselves, so as to be provided with reading input within their comfort zone (Timmis, 2022). Secondly, the reading input could be supplemented with more recent, up-to-date reading material or visual stimuli. Transforming the textbook's reading

input into updated, multimodal texts could satisfy students' need for more visual input and recent material. Moreover, the reading skill could be approached not as a standalone skill, but as a stepping stone so as to complement other skills as well (Hirvela, 2013). The teacher therefore could consider during the adaptation procedure that reading input and tasks could be designed in a way that they promote a balanced skills development so as to promote students' overall communicative competence.

The specificity, load and the amount of vocabulary repetition were also considered an asset of the current textbook. Nevertheless, the selection of the vocabulary items that will be finally taught to students should be made considering the fact that specialist language can help students engage with disciplinary knowledge (Coxhead, 2018); this selection, therefore, could be a shared decision between the ESP practitioner, students and discipline teachers. Adopting carefully selected audiovisual materials and building contextualized vocabulary learning activities upon them could also compensate for the outdated nature of the textbook (Uchihara & Webb, 2022) and student need for more visual material.

The methodological approach was one of the textbook's weak points as students clearly showed their preference for technology related and collaborative methodological approaches. Current textbook tasks and activities are methodologically grounded on teacher centered approaches, not allowing space for learner autonomy, innovative tools and collaborative practices. Possible adaptation proposals could include the inclusion of ICT and the adoption of collaborative approaches at the same time. Besides the motivational and experiential benefits of multimodal representation of the language and the opportunities for interaction and personalization, the use of technology also facilitates teaching materials in meeting the expectations of new generations of learners (Tomlinson, 2018). The use of technology in ESP teaching contexts comes with many 'affordances' as it is claimed to enhance language learning, facilitates the creation of authentic material, mediates thinking, supports self-directed learning and provides a learning environment for interaction (Li, 2018). Moreover, by integrating ICT in the ESP course, students could develop digital competencies and be prepared for employment in the 21st century (Kakoulli-Constantinou et al, 2019). When skillfully integrated as part of pedagogy

and when tasks are effectively designed (Dudeny & Hockley,2022), technology can enhance authenticity of both language and task and develop autonomous learners (Li, 2018). Specifically, Web based materials could provide exposure to authentic input (ibid), offer opportunities for digital socialization and help students experience interactivity while communicating (Koufadi, 2014). Reading tasks could be enriched with authentic reading or visual input from the Web, listening tasks could be designed on the basis of authentic video input or podcasts, while awareness of discourse features in speaking activities could be raised with the use of relevant authentic videos. Computer Mediated Communication activities in particular, could not only prepare students linguistically for their future professional requirements, but could also help in the meaningful construction of ESP knowledge (Arno-Macia, 2014). Moreover, CMC could provide an interactive environment for genuine written language use and collaboration.

Students also explicitly stated their need to be engaged in collaborative projects during their ESP course. Approaching the content of the course book with Project Based Learning could have the potential to satisfy student need for collaboration, language use and practice with discipline specific language content, in the sense that project-based learning allows for the expansion of students' communication skills and content knowledge as well (Kovalyova et al, 2016).

A last implication could be made considering the restricted hours of teaching of the ESP course. Even though the course stretches out over a period of eight months, its teaching is restricted in only one hour per week. A methodological adaptation that could be made in order to increase student input and learning time and satisfy student need for the integration of new technologies would be to create a blended learning environment creating a digital classroom where students have a 24h access or adopting the 'flipped classroom' format (Hartle, 2022). In that way the ESP practitioner could increase student interaction with language input, student collaboration and enhance their digital competencies.

Conclusion

The findings of the Needs Analysis research and the application of the textbook evaluation checklist indicated that the ESP textbook issued by the Ministry of Education for the specific context should be subject to specific adaptations in order to meet the professional requirements of 21st century Mechanical Engineering Technicians and the learning needs of adolescent students in an era dominated by technology and deeply affected by the Covid-19 pandemic.

The research carried out indicated that in order to address students' needs effectively, ESP teaching material in the specific context should promote communicative practice, integrate new technologies and include collaborative activities.. Summing up the findings one can conclude that students and other stakeholders clearly expressed the need to be taught with highly specific material which can prepare them for the professional needs of the real world as it is shaped in the present day.

It seems that the ESP practitioner finds herself in a demanding teaching situation, where students opt for high specificity and modern teaching methodologies. It may be the time for the ESP teacher and for course and material developers to rethink the material taught in the specific context through the prism of keeping up to date with the requirements of the 21st century and attempt to make a more meaningful connection between the world of education and the real world of employment.

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