Training Engineers on Communication Skills in English

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1. Introduction

Although theoretical knowledge of engineering along with technical competency is what is sought and taught in the Faculty of Engineering, it appears that this should be coupled with communication. The comments made by US graduate engineers, employed for three to five years in industry and engineering sectors are quite illuminative [9: 687-689]

“An engineer is only as good as his ability to communicate his ideas”
“There are a lot of good technical minds in the workplace, but very few that communicate effectively”
“Technical abilities are a given; communication and leadership differentiate”
“A bad presenter is career limited”

The importance of communication skills is also highlighted in research conducted in industry and engineering job markets. More specifically, according to the Employability Skills Profile (1992) cited in [8] 25 major employers in Canada wanted:

i) People who can communicate, think and continue to learn throughout their lives.
ii) People who can demonstrate positive attitudes and behaviors, responsibility and adaptability
iii) People who can work with others

The interaction of engineering knowledge with attributes such as communication, teamwork management and interpersonal skills was also discussed in a study aiming to identify how well engineering graduates were prepared for workplace. Research findings extracted from interviews enabled researchers to draw a visual representation where technical knowledge (the science of engineering) and technical skills (the practice of engineering) are fundamental for success in industry. Attributes are built on this foundation, are regarded necessary and interact with each other in professional settings. As stated “… merely having the technical knowledge and skills is not sufficient for success” 2005:176.
In the same vein, communication skills are first on the list in Japan and Malaysia while personal presentation skills is found to be the second most important skill in Japan and Singapore [1].

Yet, what is the commonest medium of communication in today’s multinational and globalised enterprises? English, as this is the lingua franca [10]. Therefore, an engineering graduate should not only be an effective communicator but should also perform this task in English. Particularly in Greece where due to economic recession many young graduates seek an international career, being able to communicate technical information in English is more than a personal attribute, it is a must.

To address this demand, two seminars taught in English, have been initiated at the Faculty of Engineering of the Aristotle University of Thessaloniki in Greece focusing mainly on senior students, i.e students in their final year of studies as well as postgraduate or Ph.D. students. Both seminars aimed at teaching the principles of technical communication, the English language structures used in written and oral forms of technical communication as well as the presentation techniques required in order to structure and deliver an effective technical proposal and presentation. In particular, the seminars were intensive and addressed two topics: “Writing and presenting technical documents in English” 30hs long and “Presentation skills and techniques” 12hs long.

2. Theoretical Background of Seminar Principles

Seminar courses were designed on the tenet of learning outcome based curricula where

“the focus is on learning that combines knowledge and skills with personal and sociocultural competences;
knowledge is set in a context and is interdisciplinary;
focus on the labour market and employment needs (traditional curricula sticks o the educational context and the body of knowledge to be transmitted);
learning is encouraged in a wide range of locations by different methods.” [2:1]

Additionally, the humanistic approach in education [7:14], was considered when designing the course content and implementing the teaching approach. Thus through studying and practicing technical communication, learners were exposed to relating their personal experiences, aspirations, values and needs to the subject matter at hand. Integrating technical communication and personal growth into the syllabus was also targeted.

Humanistic education principles are partly embedded in English for Specific Purposes (ESP) theory which emphasizes the concept of authenticity. More specifically during an ESP course professional and personal experiences are activated when relating new knowledge of English to existing scientific knowledge and professional communication requirements. To put this alternatively, the content of an ESP course, -such as the present- should include material,
communicative tasks and events, that learners can authentically use or be involved in situations outside class. [3]. An example of this is reported in the study of Kassim and Ali 2010 [5] who in an effort to design an English communication module for engineering students in Malaysia, investigated the communication skills and communicative events that engineers have to handle throughout their careers. It was found that communication skills in a variety of contexts in the workplace are regarded important for recruitment and promotion while the most important communicative events are teleconferencing, networking for contacts and advice, and presenting new ideas and strategies.

3. Seminar Description

The seminars to be described have many different features, yet they are very similar in their aim, which is ability to communicate technical information in English, practice on authentic professional tasks to be faced and personal growth through skills development. The description of each seminar will be briefly outlined.

The syllabus of the seminar titled “Writing and presenting technical documents in English” introduced participants to the basics of technical writing such as definitions, descriptions, laboratory and project report writing as well as proposal writing. The importance of documentation, the plagiarism types along with fundamental techniques of visuals use were also presented. Participants had to prepare a written homework after each class, send it electronically to the tutor and receive feedback via e-mail prior to the next class so that they had time to re-write it. As far as oral presentation is concerned, students were taught the principles of oral presentation and were then asked to apply the knowledge gained during the seminar in a final homework: to write an unsolicited proposal about a problem encountered at Aristotle University. This last homework was written in groups as opposed to the rest of written assignments of the seminar which were carried out individually. The reason for this was to train students on cooperating with students they did not know particularly well and identify thus the level of teamwork skill they had. Finally the proposal had to be orally presented, supported by PowerPoint slides and evaluated by their peer students. The effectiveness in communicating their idea as well as the presentation skills of each member were assessed. Moreover the oral presentation was video recorded and viewed by each group and self assessed as well. To avoid bias, tutor’s comments were delivered once the evaluation was over. DVDs containing all the presentations were given to all students after the end of the seminar.

The seminar titled “Presentation skills and techniques” had a less expanded syllabus since it lasted only 12 hours. It introduced techniques about a) the content of a presentation (how to specify audience needs, how to select the presentation content and how to structure the presentation) b) clues which support the presentation content (visuals) and c) performance tips like dealing with stress, non-verbal communication cues and question answering. Then students were asked to prepare a 6 min presentation in English on a topic which they preferred. Presentations were video recorded, commented by the tutor and then uploaded on the Blackboard platform so that students could view and revise them. In other words, each student had the opportunity to make a presentation twice so that s/he had the chance during the seminar to realize the strengths and weaknesses of the first presentation along with his/her performance limitations, restructure it and present it once more. Thus s/he could monitor his/her progress and check it repeatedly because the second presentation was also video recorded. Last both versions of the presentation were recorded in a DVD which was given to seminar participants so that they themselves could identify their progress between the first and second presentation.
4. Seminar Evaluation

On completion of the seminar, participants were asked to evaluate it by filling in a general questionnaire designed by the Centre for Foreign Language Teaching (CFLT) according to the guidelines of Quality Assurance Unit of the Aristotle University. This questionnaire is a standard course evaluation tool distributed in all modules taught by members of CFLT, is written in Greek and aims to elicit student satisfaction/dissatisfaction through a rating scaling ranging from 1(lowest) to 5 (highest). It consists of 23 closed questions designed according to Likhert scale which are further divided in three parts:

a) part 1 consists of items investigating the course (i.e. course aims and objectives, material organization, use and usefulness of knowledge, assignments)

b) part 2 contains questions examining tutor’s performance
c) part 3 includes items about student performance (attendance, study hours, assignment writing)

Finally an open ended question which aims to record student remarks and comments is also included in the questionnaire.

The research sample composed of 48 students of all the Schools of the Faculty of Engineering, namely School of Civil Engineering, School of Architecture, School of Rural and Surveying Engineering, School of Mechanical Engineering, School of Electrical and Computer Engineering, School of Chemical Engineering, School of Urban-Regional Planning and Development Engineering.

5. Results

Although the seminar participants were 48, we received 45 questionnaires so the results to be presented were extracted from this sample. Moreover the results presentation and analysis will be limited down to part 1 questionnaire items (appendix 1) because these are directly related to the course content. The remaining items extract information irrelevant to the current research because they investigate tutor performance and student performance.

The mean score for all questionnaire items of part 1 ranged from 4.14 to 4.77 indicating the students’ satisfaction. A detailed account of the separate mean scores for each question is provided below:

Table 1. Case summary for questions 1-7 pertaining to seminar content

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<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>A6</th>
<th>A7</th>
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<tr>
<td>N</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>44</td>
<td>44</td>
<td>44</td>
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<tr>
<td>Mean</td>
<td>4.76</td>
<td>4.67</td>
<td>4.69</td>
<td>4.56</td>
<td>4.57</td>
<td>4.14</td>
<td>4.57</td>
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<tr>
<td>Std. Deviation</td>
<td>.435</td>
<td>.477</td>
<td>.514</td>
<td>.503</td>
<td>.545</td>
<td>.905</td>
<td>.625</td>
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<tr>
<td>Median</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>4.00</td>
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Table 2. Case summary for questions 8-13 pertaining to seminar content

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<th>A12</th>
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<td>44</td>
<td>44</td>
<td>43</td>
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<tr>
<td>Mean</td>
<td>4.36</td>
<td>4.70</td>
<td>4.77</td>
<td>4.64</td>
<td>4.40</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>.718</td>
<td>.462</td>
<td>.480</td>
<td>.718</td>
<td>.791</td>
</tr>
<tr>
<td>Median</td>
<td>4.50</td>
<td>5.00</td>
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At this point it is considered useful to initiate the detailed presentation of the most insightful findings through qualitative data extracted from the comments made by the students. These will be supported by the quantitative data produced from specific questionnaire items.

“The seminar was interesting and filled in the existing gap of English instruction which occurs in my School (School of Civil Engineering).”

The above comments illuminate further the high scores of Q.1: Where the course aims clear? Score 4.76 Q. 2 Did the material covered respond to the aims of the course? Score 4.67 and suggest that courses enabled students to use English in a discipline focused manner expanding thus their language skills. It is true that English courses are compulsory in three Schools only (Schools of Architecture, Mechanical Engineering and Rural and Surveying Engineering) while in the rest English is either an elective (School of Chemical Engineering) or is not included at all in the curriculum.

“This course was of great value for me. It was a great opportunity to refresh my English and learn new stuff concerning my discipline of study. I think it will surely help me in my graduate studies.”

This comment complies with the Q. 6 Use and usefulness of knowledge in relation to your studies? The score was 4.14 indicating that students thought that the courses were definitely related to their studies and were also considered useful. Although usefulness could not be assessed at that stage since they lacked professional experience and sound knowledge of job tasks, the fact that they considered the courses of use is really important. Particularly if we take into account the comment of a student: “The theme of the course was interesting and original”.

In fact students’ perceptions of the courses were eloquently phrased: “Much more interesting and useful than I had imagined before classes started” whereas students repeatedly mentioned that it was interesting and also expressed some concern about duration: “May be the seminars could have lasted more hours”.

Finally there are comments which reflect student positive attitude to the humanistic teaching approach adopted in the seminars: “A very good climate of educational process, interaction and discussion was created.”

Moreover, a clear indication of personal growth through skills development is suggested in one more comment: “The seminar and my contact with the tutor enabled me to have more self confidence regarding my skills in English. Also she transmitted a general zest for try and venture”.

Nevertheless, we believe that the most valuable data are those selected by students who had graduated and were then exposed to situations where technical communication was a requisite. Those comments were delivered to the tutor via personal communication –mostly e-mails- sent by the students’ own initiative.

“The technical writing seminar taught me how to organize presentations. Ever since whenever I have to present something I follow this pattern”.

“The seminar offers an excellent alternative to what already happened up to now: learn how to communicate technical information by experience”.

“According to my opinion, the seminar goes beyond what its title (suggests); its forms the foundation for building a scientific attitude and ethics as well as the academic personality. It would have been very difficult and time consuming to reach that level of knowledge relying on personal experience only”.

The last two comments indicate that technical communication had been learnt by experience so far. No module or course in the University inculcated the necessity and principles of
technical communication, not to mention the practice in English. Nevertheless, if we consider the employment demands outlined earlier through research results, the ability to communicate is one of the most important skills demanded by engineers nowadays. Therefore, it is presently suggested to include technical communication modules in the curricula and syllabi followed by the Faculty of Engineering.

6. Discussion and Conclusion

The research invited on the satisfaction/dissatisfaction of engineering students about the seminars on “Writing and presenting technical documents in English” and “Presentation skills and techniques” taught at the Faculty of Engineering of Aristotle University in Thessaloniki, Greece.

The quantitative and qualitative results indicate that the seminar principles [2:1] were reflected through the content and teaching approach and were perceived by students. More specifically: i) knowledge and skills were combined with personal skills when communicating in writing and presenting orally technical information in English. ii) knowledge and skills were practiced interdisciplinary when writing a proposal about a general topic cooperating with students of other disciplines. iii) focus was laid on the labor market and employment needs since a seminar in English was designed to teach student attributes required such as ability to communicate and work with others [8].

In addition to these, transferable skills contributing to personal growth were attained. Apart from those practiced through the specific structure of the seminars –teamwork, ability to present, ability to communicate technical knowledge- self confidence when using English as well as scientific ethics and attitude were also developed by some students.

The importance of these conclusions may be examined from two perspective: a) the student perspective and b) the university perspective.

Regarding students, the benefits are focused on the development of transferable skills via English. In other words, through professionally focused instruction of English, they practice skills which will be of use throughout their careers. If one of the aims of education is to prepare learners for future needs, then seminars like this can implement this quite effectively.

Regarding university, findings show how a seminar taught in English with ESP focus, can achieve a lot more than simply teaching the language. It can be outcome based, job oriented and as results show, interesting for students. Therefore if curriculum reform is considered, courses that can equip learners with disciplined focused and professionally oriented aim should be included.

REFERENCES


Appendix I

Questionnaire items of part 1

Rating scale
1=not at all    2=a little    3=average    4=a lot    5=very much

The course:
Q.1: Were the course aims clear?
Q. 2 Did the material covered respond to the aims of the course?
Q. 4 Did the educational material that was used, assist in better comprehending the topic?
Q. 5 Was the teaching material (textbooks, notes, exercises) sufficient for the needs of the course?
Q. 6 Use and usefulness of knowledge in relation to your studies?

To be answered only in those cases where written or/and oral assignments existed:
Q.7 Was the (assignment) topic delivered in time? (in advance)
Q. 8 Was the deadline reasonable?
Q. 10. Was there tutor guidance?
Q. 11. Were the comments of the tutor constructive and analytic?
Q. 12 Was there an opportunity to improve the assignment?
Q.13 Did the specific assignment help you to conceptualize the specific topic?