An evaluation of engineering students' perceptions towards the English language teaching-learning environment at engineering faculties in Turkey: the case of Firat, Ataturk, Inonu and Dicle Universities

Mehmet N. Gömleksiz

Firat University
Elazig, Turkey

ABSTRACT: In this article, the author investigates engineering students' views towards learning English terms of the need for, and the effort required to, learn English and gain English qualifications, as well as the teaching strategies of their instructors. The study sample was comprised of 1,562 engineering students enrolled in four different universities in Turkey. The results revealed that engineering students accepted learning English as being necessary to be a good engineer. They also reported some problems with teaching strategies used by their instructors in English classes of engineering faculties in Turkey. Statistically significant differences were found across the groups with regard to gender, university and department of the engineering students.

INTRODUCTION

The most important aspect of the 21st Century draws on the role of well-trained individuals as part of meeting the needs and necessities of a rapidly changing world. At present, many developing countries are striding towards training well-qualified individuals by providing better educational environments so that they can compete with the rapid and permanent changes. One of the most important methods of training qualified individuals is to teach them at least one foreign language.

In the engineering education community, much effort is placed on striving to improve the education that is offered to students. Current efforts include programmes to prepare a diverse cadre of engineers, increased accountability about how effectively engineering programmes prepare engineering students, and an interest in preparing engineers to function in a global community with ethical and professional responsibilities. The education community has responded with strategies such as emphasising pedagogies that are known to be effective for diverse learners, adopting new policies, creating new research centres devoted to engineering education issues, as well as other equally exciting developments [1].

The information society requires individuals to have many diverse qualifications. Providing opportunities so that students can acquire the necessary qualifications depends upon making students more active in the learning-teaching process; this requires the adaptation of education for different students with different learning styles [2].

Many engineering graduates are perceived by industry and academia as being unable to practice in industry because of the change of educational focus from the practical to the theoretical [3]. This gap between theory- and practice-based education should be taken into consideration. This makes it necessary to build bridges between theory and practice.

Turkey struggles to increase the standards of engineering education. Engineering education in Turkey is undergoing significant structural changes. These changes takes place in the paradigm of pedagogy as traditional engineering curricula are unable to meet the needs of the society.

Traditional content-based foreign language curricula are far from meeting the needs and demands of learners in the information age. Traditional engineering curricula have been designed to provide what engineering students need to know, with the *what* referring to content. Learning to learn has been less emphasised [4]. New approaches in learning can assist in *learning to learn* since students learn the way they will learn for the rest of their lives [5]. Although the presence, role and perception of design in the engineering curriculum have improved markedly in recent years, further improvements are still needed [6][7].

Foreign language learning has always been seen as a crucial need for the development of an economic potential of a nation [8]. People need foreign language skills more than as they ever did and engineering students are showing a rapidly rising interest to learning English given the changes in the era of globalisation. Riemer stated that *those engineering institutions, which meet language requirements for the new global engineer, will be ready to face the new millennium* [9].

There are certain factors that lead to more or less successful language learning. The factors that are generally considered to be relevant to language learning are intelligence, aptitude, motivation, attitudes, age and learner preferences [10]. It should also be remembered that learning a language in itself is a highly complex cognitive task of working out structural rules, norms of use and appropriateness, how to sequence utterances, as well as cultural constraints [11].

Foreign language teaching is a serious job and it requires scientifically-oriented teachers [12]. Changing conditions in the teaching-learning process force teachers to find solutions for the growing demand for better and satisfactory language learning, and this makes it necessary to use new approaches, methods and techniques in order to conduct the best learning activities [13].

How best to teach a foreign language has always been a controversial issue. Many theories have emerged during the last few decades, and each has claimed to have the key to realising effective English Language Teaching (ELT) and learning [14]. The effort has always been to enable learners to learn English effectively, making the language more meaningful to them and increasing the number of opportunities for language practice in the classroom.

Aim of the Study

The present study is an attempt to explore engineering students' opinions towards the ELT environment at four engineering faculties in Turkey. The study was aimed at identifying any statistically significant differences among the engineering students' views towards the necessity of, and their efforts in, learning English, their teachers' qualifications and the teaching strategies in terms of the variables of gender, university and department.

METHOD

Population and Sampling

The population of this study was comprised of second and third grade students from the Engineering Faculties of four Turkish universities, namely: Firat, Dicle, Inonu and Ataturk during the 2005-2006 academic year. The sample consisted of 1,562 engineering students selected from 11 different engineering departments of those universities. The demographic variables of the student sample are listed in Table 1.

Table 1: Demographic information about the participants.

Demographic Variables	n	%
Gender		
Male	893	57.2
Female	669	42.8
Department		
Computer + Electrical & Electronics Eng.	323	20.6
Architecture + Civil Engineering	304	19.5
Metallurgical-Materials +Mechanical Eng.	311	19.9
Environmental + Geological + Mining Eng.	315	20.2
Chemical + Food Engineering	309	19.8
University		
Firat	434	27.8
Ataturk	385	24.6
İnonu	360	23.1
Dicle	383	24.5
Total	1,562	100.0

Data Collection Tool

A questionnaire was developed and used to collect the data. The questionnaire was divided into two parts. The first part sought to obtain the following information: gender, university and department. The second part of the questionnaire incorporated a 24-item, five-point Likert-type scale, ranging from strongly agree, through to agree, partly agree, disagree and strongly disagree. The scale was first piloted on 375 students for the factor analysis process. The items with factor loadings above 0.35 were considered as useful. Those items that had less than 0.35 factor loading were removed from the scale [15]. The Cronbach α reliability coefficient was calculated to be 0.93 for the whole scale. Four subscales were measured: necessity, effort, qualification and teaching strategies. The Cronbach α values calculated for the four sub-scales varied between 0.88 and 0.96. The KMO value of the scale was calculated to be 0.87 and the Bartlett's test was measured to be 1,7121.317 ($p<0.05$).

Data Analysis

Descriptive statistics (counts and percentage) were used to report the demographic characteristics of the participants. A t-test was utilised to determine the significant differences of students' views attributed to gender. A one-way analysis of variance (ANOVA) was undertaken to see if there were any statistically significant differences in terms of university and department variables, and a *post hoc* Scheffé test was subsequently run to see where those differences lay.

FINDINGS

The results mentioned here are mainly based on the data obtained from the questionnaire and Likert-style scale. Engineering students' views towards learning English and their teachers were evaluated in terms of gender, university and department variables in the tables given below.

As can be seen in Table 2, statistically significant differences were found in terms of the gender of the engineering students. A higher mean rating suggested that male students were more in agreement with the necessity of learning English than the female students. The males also stressed that they found their instructors more qualified than the female students did. With regard to gender differences, it appears from the data that there was a significant gender difference regarding students' efforts to learn English. Female participants engaged in greater efforts to learn English compared to the male students despite the fact that male students found it more necessary. This shows that the male students do not study to learn English as much as female students do, although they accept its importance. Female students also stated that the teaching strategies of their instructors were efficient and effective.

Table 2: t-test results for gender on necessity, effort, qualification and strategy subscales.

Subscales	Gender	n	$\overline{X}$	SD	t	p
Necessity	Male	893	3.84	0.837	2.950*	0.003
	Female	669	3.72	0.608		
Effort	Male	893	2.68	0.903	-20.584*	0.000
	Female	669	3.65	0.937		
Qualifi-cation	Male	893	3.75	0.666	7.974*	0.000
	Female	669	3.45	0.806		
Strategy	Male	893	3.09	1.034	-9.349*	0.000
	Female	669	3.54	0.802		
*Significant at the 0.05 level						

The ANOVA results presented in Table 3 indicate significant differences across the groups in terms of the university variable.

The observed difference favoured Ataturk and Firat universities with regard to the four variables. The Scheffé test showed that the mean scores obtained by the engineering students of Firat and Ataturk universities varied significantly from those of the other two universities (Inonu and Dicle). That difference across universities can be interpreted as a result of the quality of the education offered to students. The richer the teaching-learning environment that the institutions provide to their students, the better the results obtained by the students. Students' success mostly depends upon the level of quality of the educational experience provided by a richly diverse environment.

Table 3: ANOVA results for university on necessity, effort, qualification and strategy subscales.

Subscales	University	n	$\overline{X}$	SD	F	p
Necessity	Firat	434	3.78	0.890	14.039*	0.000
	Ataturk	385	3.97	0.778		
	Inonu	360	3.62	0.640		
	Dicle	383	3.77	0.586		
Effort	Firat	434	3.81	0.936	205.400*	0.000
	Ataturk	385	3.52	0.951		
	Inonu	360	2.61	0.750		
	Dicle	383	2.54	0.874		
Qualifi-cation	Firat	434	3.96	0.686	105.519*	0.000
	Ataturk	385	3.69	0.752		
	Inonu	360	3.66	0.471		
	Dicle	383	3.13	0.768		
Strategy	Firat	434	3.35	0.848	101.138*	0.000
	Ataturk	385	3.81	0.680		
	Inonu	360	3.30	0.844		
	Dicle	383	2.68	1.113		
*Significant at the 0.05 level						

A comparison of the ANOVA results for engineering departments revealed that the difference across groups concerning the four variables was significant. The results of the Scheffé test, which showed where the differences lay, identified students of computer engineering, and electrical and electronics engineering as having the highest mean scores. These students had the highest level of acceptance that learning English is necessary. The results also indicate that the highest level of effort to learn English was by students enrolled in computer engineering, and electrical and electronics engineering. A closer look at the data also suggests that students of environmental, geological and mining engineering had the lowest mean scores across the four constructs when compared to those students from other engineering areas.

DISCUSSION AND RESULTS

The present study provides important data on the importance of ELT for engineering education in Turkey. Using four large universities as case studies, this study investigated the perceptions of 1,562 engineering students towards ELT classroom settings. The findings of the current study imply that it is important to organise a more sufficient and effective teaching/learning ELT environment for engineering students given the increasing demand for learning English. As noted above, there is an emerging trend to learn a foreign language in engineering education in Turkey and much effort has been placed on language teaching as teaching English effectively becomes an important part of engineering education.

On the other hand, the study results indicated that necessity and effort to learn English in gender are statistically significant. Female students agreed more with the effort to learn a foreign language. This tendency is in line with the results of the numerous studies that emphasise that female students employ more learning strategies and/or employ strategies more effectively [16-19].

Significant differences were observed among the students' views in terms of the university variable. The students from universities that had better equipment and more experience in engineering education showed better performance than those from the other universities. This should be accepted as a natural result. The better learning environments that institutions offer, then the more success they get.

Table 4: ANOVA results for engineering departments on necessity, effort, qualification and strategy subscales.

Subscales	Departments	n	$\overline{X}$	SD	F	P
Necessity	Computer + Electrical & Electronics Engineering	323	4.02	0.790	27,945*	0,000
	Architecture + Civil Engineering	304	3.80	0.599		
	Metallurgical & Materials + Mechanical Engineering	311	3.96	0.676		
	Environmental + Geological + Mining Engineering	315	3.49	0.896		
	Chemical + Food Engineering	309	3.66	0.620		
Effort	Computer + Electrical & Electronics Engineering	323	3.63	0.888	96,527*	0,000
	Architecture + Civil Engineering	304	2.93	1.163		
	Metallurgical & Materials + Mechanical Engineering	311	3.58	0.994		
	Environmental + Geological + Mining Engineering	315	2.94	0.845		
	Chemical + Food Engineering	309	2.41	0.683		
Qualification	Computer + Electrical & Electronics Engineering	323	4.10	0.671	129,192*	0,000
	Architecture + Civil Engineering	304	3.71	0.559		
	Metallurgical & Materials + Mechanical Engineering	311	3.85	0.645		
	Environmental + Geological + Mining Engineering	315	3.50	0.644		
	Chemical + Food Engineering	309	2.96	0.697		
Strategy	Computer + Electrical & Electronics Engineering	323	3.77	0.597	42,948*	0,000
	Architecture + Civil Engineering	304	3.43	1.132		
	Metallurgical & Materials + Mechanical Engineering	311	3.15	0.780		
	Environmental + Geological + Mining Engineering	315	2.85	1.114		
	Chemical + Food Engineering	309	3.20	0.875		

Data obtained from the study showed that the students enrolled in computer engineering, and electrical and electronics engineering accepted more the learning of English as being necessary and, as a result of this, they showed a willingness to put more effort into learning English. The students from these departments had more positive attitudes towards learning than those from other departments. This is in harmony with Akpinar's research findings, which indicate that students of computer engineering, and electrical and electronics engineering feel more confident in a classroom setting [20]. Nunan has noted that feeling confident is an important factor that can affect the learning process [21].

One of the most significant conclusions to be drawn from the findings of this study was that the students' views regarding the qualification and teaching strategies of ELT teachers at their engineering departments differed significantly in terms of gender, university and department variables. Female engineering students found ELT teachers' qualifications less sufficient, while male students found teaching strategies less effective. One of the major problems facing ELT in engineering departments in Turkey is the differing quality of teachers. It is the teacher who serves as a guide in the classroom, facilitates learning, improves the quality of the ELT environment and affects students' success.

A teacher's openness to change influences his/her willingness to integrate technology into the classroom [22]. As students and faculties become accustomed to the benefits of instructional technology in teaching/learning, both will demand the opportunity to use them.

A host of other factors, such as the individual's background, culture, attributes and attitudes, individual learning styles as well as the mode of teaching adopted, affect the processes of teaching and learning. Courses in engineering education at all levels need to be structured to take the factors mentioned above into account if effective teaching and learning is to be accomplished with a lasting impact [23]. Special effort should be made to assist engineering students' language learning. *Students should be shown how to learn and they should be told how they overcome learning difficulties* [24].

As in all teaching/learning environments, providing effective ELT in engineering education can be facilitated by integrating technology into the teaching-learning process. Computers and audiovisual equipment represent a very considerable learning resource and help motivate students [25]. Innovative learning environments are more likely to improve the quality of education, as well as the provide more equal educational opportunities that foster students' participation in the teaching/ learning environment [26]. As evidenced by the findings of several studies, instructional technology has a great effect on students learning effectively [27-32].

Briefly, the findings of the current study indicate that there are gender, university and department differences towards accepting the necessity of the role and importance of English, the effort undertaken to learning it, and the strategies used in English classes by their instructors.

RECOMMENDATIONS

The decision-makers in engineering education in the higher education system in Turkey should take into consideration the following key elements described below.

Sufficient attention has to be given to ELT in order to realise effective language learning. Effective teachers use a variety of means, some formal and others informal, to determine how much and how well their students are learning. For example, to formally evaluate student learning, most teachers use quizzes, tests, examinations, term papers, laboratory reports and homework. These formal evaluation techniques help the instructor to evaluate a student's achievements and assign grades.

Learners have different strategies, approaches, patterns of abilities and learning styles that are a function of the interaction between their heredity and prior experiences. Language learning environment should be designed in such a manner so that student should find it meaningful to learn the language. This should lead them to be more willing to be a part of the learning process. In order to achieve this, all engineering departments should operate and reorganise their language teaching policy so as to acquire a substantial amount of language competences in Turkish engineering education. The quality of ELT in engineering education can be improved through collaboration among engineering faculties.

Learning is facilitated through the effective and wide use of instructional technology. As quality improves through the use of more interactive and engaging learning experiences, including constructivist methodologies, computer-based training materials for engineering education are likely to become much more prevalent in the near future. Effective strategies for the use of instructional technology improve student learning. Thus, engineering faculties should explore, implement and extend learning activities and continue to build on the use of instructional technology implementations in order to increase the quality of ELT and improve engineering students' English based on engineering terminology.

Different strategies, approaches, patterns of abilities and learning styles, which are a function of the interaction between students' heredity and their prior experiences, should be taken into consideration. Learning styles reflect students' preferences and tendencies related to learning and it affects their behaviour throughout their lives. Teachers are expected to be aware of their students' individual learning styles so that effective learning can be realised. Motivation and positive attitudes are closely related to success in language learning [33]. Students' motivation to learn and their sense of self impact on what is learned, how much is learned, and how much effort is put into the learning process. As such, their motivation levels should also be determined and strategies developed in this direction.

The main finding presented in this study was that providing success in foreign language learning will increase the level of quality in engineering education and help engineering educators to train well-educated engineers in the direction of the needs and necessities of the globalised world.

Although the role and importance of learning a foreign language in engineering education have improved markedly in recent years, both the curriculum developers in the ELT area and decision-makers in engineering education would argue that further improvements are necessary.

To conclude, in analysing English Language Teaching (ELT) provided to engineering students in the Turkish context, the findings from this study draw attention to the necessity of a well-organised ELT programme for engineering students. The

results of this study strongly point to the need for a change to the ELT system. In order to discover problems and develop effective solutions to improve English language learning in engineering education, the determining factors both inside and outside the classroom should be taken into consideration.

REFERENCES

1. Turns, J., Atman, J.C., Adams, R.S. and Barker, T., Research on engineering student knowing: trends and opportunities. *J. of Engng. Educ.*, 94, **1**, 26-40 (2005).
2. Güven, M. and Kürüm, D., Öğrenme stilleri ve eleştirel düşünme arasındaki ilişkiye genel bir bakış, *Anadolu Üniversitesi Sosyal Bilimler Dergisi,* 6, **1**, 75-89 (2006).
3. Dutson, A.J., Todd, R.H., Magleby, S.P. and Sorensen, C.D., A review of literature on teaching design through project-oriented capstone courses. *J. of Engng. Educ.*, 76, **1**, 17-28 (1997).
4. Technology Accreditation Commission Report (2003), www.abet.org/ documents/tac/tc004 pev report 7-15-03.doc.
5. Bourne, J., Harris, D. and Mayadas, F., Online engineering education: learning anywhere, anytime. *J. of Engng. Educ.*, 94, **1**, 131-146 (2005).
6. Todd, R. H., and Magleby, S.P., Evaluation and rewards for faculty involved in engineering design education. *Inter. J. of Engng. Educ.*, 20, **3**, 333-340 (2004).
7. McMasters, J.H., Influencing engineering education: one (aerospace) industry perspective. *Inter. J. of Engng. Educ.*, 20, **3**, 353-371 (2004).
8. Byram, M., *Language Teaching as Political Action*. In: Bax, M. (Ed.), Reflections on Language and Language Learning. Philadelphia: John Benjamins Publishing (2002).
9. Riemer, M.J., English and communication skills for the global engineer. *Global J. of Engng. Educ.*, 6, **1**, 91-100 (2002).
10. Lightbown, P.M. and Spada, N., *Factors Affecting Second Language Learning*. In: Mercer, N. (Ed.), English Language Teaching in its Social Context. Florence: Routledge (2000).
11. Williams, M., *Teaching Thinking through a Foreign Language.* In: Williams, M. (Ed.), Thinking through the Curriculum. Florence: Routledge (1998).
12. Demirezen, M., The importance of teachers' pronunciation: teacher factor in foreign language classes. *Proc. 1st National Tömer Conf., Tömer Gaziantep Branch*, 100-107 (1997).
13. Gömleksiz, M.N., A comparison of modular approach and traditional method on students' achievement in foreign language learning: searching for quality. *Proc. 1st Inter. Conf. on ELT*, Gazimağusa City, Turkish Republic of Northern Cyprus, 390-404 (2005).
14. Kailani, T.Z., A synthesized pedagogical methodology for English classroom interactions. *Inter. Review of Applied Linguistics in Language Teaching*, 95, **33**, 333-344 (1995).
15. Büyüköztürk, Ş., *Sosyal Bilimler İçin Veri Analizi El Kitabı*. Ankara: PegemA Yayıncılık (2003).
16. Gömleksiz, M.N., Üniversitelerde yürütülen yabancı dil derslerine ilişkin öğrenci görüşlerinin değerlendirilmesi. *F.Ü. Sosyal Bilimler Dergisi*, 12, **1**, 143-158 (2002).
17. Nyikos, M., Sex-related differences in adult language learning: socialization and memory factors. *Modern Language J.*, 74, **3**, 273-287 (1990).
18. Erhman, M. and Oxford, R., Effects of sex differences, career choice, and psychological type on adult language learning strategies. *Modern Language J.*, 73, 3-13 (1989).
19. Oxford, R., Nyikos, M. and Ehrman, M., Vive la difference? Reflections on sex differences in use of language learning strategies. *Foreign Language Annals*, 21, 321-329 (1988).
20. Akpinar, B., The effects of the changes that have taken place in the global pedagogical paradigms in Turkish engineering education. *World Trans. on Engng. and Technology Educ.*, 5, **1**, 201-206 (2006).
21. Nunan, D., *Designing Tasks for the Communicative Classroom* (11th printing). Cambridge: Cambridge University Press (1999).
22. Baylor, A.L. and Ritchie, D., What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? *Computers & Educ.*, 39, **4**, 395-414 (2002).
23. Göl, Ö., Nafalski, A., McDermott, K.J., Sathasilvam, S. and Chan, D., A liberal approach to teaching advanced engineering courses. *Global J. of Engng. Educ.*, 9, **2**, 185-193 (2005).
24. Gumusay, Z., A comparative study on the learning process of two English classes – a university English preparation class vs a state primary school English class in Turkey. *Proc. 1st Inter. Conf. on ELT*, Gazimağusa City, Turkish Republic of Northern Cyprus, 165-171 (2005).
25. Dean, J., *Improving Children's Learning: Effective Teaching in the Primary School.* London: Routledge (1999).
26. Hakkarainen, K. and Palonen, T., Patterns of female and male students' participation in peer interaction in computer-supported learning. *Computers & Educ.*, 40, **4**, 327-342 (2003).
27. Davies, T., Confidence! Its role in the creative teaching and learning of design and technology. *J. of Technology Educ.*, 12, **1**, 18-31 (2000).
28. Tsou, W., Wang, W. and Li, H., How computers facilitate English foreign language learners acquire English. *Computers & Educ.*, 39, **4**, 415-428 (2002).
29. Jonassen, D.H. and Reeves, T.C., *Learning with Technology: Using Computers as Cognitive Tools*. In: Jonassen, D.H. (Ed.), Handbook of Research for Educational Communications and Technology. New York: Simon & Schuster Macmillan, 693-719 (1996).
30. Kulik, C.C. and Kulik, J.A., Effectiveness of computer-based instruction: an updated analysis. *Computers in Human Behavior*, 7, **1-2**, 75-94 (1991).
31. Gonzalez Mendez, C.R., The Effect of Computer-Assisted Language Learning on Puerto Rican University Students' Writing Achievement in a Basic English Course. Unpublished doctoral dissertation, University of Puerto Rico (2005).
32. Brewer, A.K., International Student Adjustment, Technology Use and English Language Learning in Academia. Unpublished doctoral dissertation, American University (2005).
33. Gardner, R., *Social Psychology and Second Language Learning: the Role of Attitudes and Motivation.* London: Edward Arnold (1985).