

The importance of a second language as a requirement for engineers. A case study in Mexico

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Abstract: While in several countries, a second language is practically compulsory, even for non-professionals, it's not the case of Mexico. Despite its proximity and significant commercial and cultural intercourse with the United States, most of its population do not speak English, including emigrant workers.

The North American Free Trade Agreement (NAFTA) involves opportunities for Mexican engineers. Not only because of the impact on the national economy, but future engineers should be also able, once restrictions are lowered, to work in the US as registered professionals. This circumstances emphasize the already existing necessity of learning a second language, particularly English.

The Metropolitan Autonomous University, Campus Azcapotzalco, is a public school of engineering located in the northern part of Mexico City. At present, an effort is being made to update the engineering undergraduate programs, which includes incorporation of a foreign language requirement to obtain the bachelor degree. This regulation was already sanctioned by the Colegio Académico, the highest governing organism in the University.

A way to deal with this problem consists simply of establishing an exam, once the adequate level is selected and the operating problems solved. However, as a public school, it is not appropriate, probably not possible, to include the exam in the programs without any support by the institution to aid the students in dealing with this new requirement.

The student population is varied with regard to the social-economic situation, but an important percentage belong to middle and working class families and come from public high schools, in which only the elementary level of a foreign language is deficiently taught. Besides, most of the students have little possibilities of learning a foreign language at a private school.

It is fortunate that the campus has an advanced and well equipped Foreign Languages Center; nine courses of three different foreign languages are offered, divided in three levels; however, to contend with our aim, the capabilities of this center should be dramatically increased if the whole population of the engineering school were to attend.

With the purpose of estimating the real necessities and proposing an operative solution, a study was made within the past two years, with the support of statistical data and an inquiry applied to selected groups of students. The following parameters were investigated:

- The identification of the most important foreign language in the opinion of the students: it was expected that the majority would choose English (in fact, 98 % did).
- The student's previous performance to be required for taking the language courses: this is to ensure a high probability that the admitted student will complete his studies.
- The classification of the students with regard to their skills and levels in the knowledge of foreign languages, particularly English.
- How would they manage to get prepared to pass the exam.
- Differences in terms of sex, age, careers, number of credits, etc.

Once the study was finished, a number of strategies were recommended.

Introduction

In advanced countries it is accepted that command of a second language is important and even essential for the practice of various professions and also for non-professionals. In Europe, for instance, the economic integration has emphasized this necessity and in the case of Japan, the strong trade policy promoted by this country has demanded the knowledge of an European language by a large part of the population, particularly English.

In Latin America and specifically in Mexico, it is an overwhelming fact that most of the international trade involves the United States of America; a very important part of this trade concerns tourism, an activity that specifically requires English language to perform successfully. Another element is the permanent transit of people, goods and services along the border shared by both countries, not to mention the implications derived from the North American Free Trade Agreement, which represents a whole of opportunities, but also commitments in this area.

English teaching in secondary and high schools in the Mexican public education system is limited to the elementary level. The situation is different in private schools, where a second language, mostly English, is a common occurrence.

With regards to the engineering professional practice, the importance in dealing with varied and changing contexts is increasing. The already mentioned NAFTA brings opportunities for the Mexican engineer but at the same time will be compelling to act and compete in a larger geographic area. Under certain regulations, Mexican engineers will be able to work as registered professionals in the United States or Canada. Public universities should no longer remain indifferent in the face of this problem. Additionally, the access to bibliography and up to date documents in English, specially through Internet, is no longer an alternative source but part of daily life. In short, foreign languages teaching and specially English teaching, has become an urgent problem to be managed by engineering schools as a part of their educative offer to students, in order to deal with a global world.

The Universidad Autónoma Metropolitana (UAM) is a public institution consisting of three campuses at different locations in Mexico City, with a total population of 43,000 students divided in nine academic divisions. Every division offers a variable number of options in the bachelor's and postgraduate levels. Students belong to different social classes, but an important fraction belong to middle and working classes and come from public high schools. The problem of foreign languages teaching is a main concern for the top governing organisms of the University. The *Colegio Académico* is the organism in charge of the policies and

regulations of the University; an important resolution regarding this problem was issued in its session number 184, celebrated in April, 22nd., 1997; the relevant points are:

- The academic divisions must reform their bachelor's programs in order to incorporate the requisite of a foreign language or languages with determination of the level.
- Regulations will be formulated in order to issue certificates of comprehension of the foreign language, to design and program the tests and to accept certificates issued by other institutions
- Teaching of foreign languages will be strengthened and increased in the three campuses and its facilities will be improved, specially with the introduction of modern techniques.
- Trimester planning will be introduced for the certification of foreign languages comprehension (In this University, teaching is organized in trimesters)

Before this resolution was taken, and as a part of an integral reform of the bachelor's programs, a study was conducted in the Division of Basic Sciences and Engineering of the campus Azcapotzalco, one of the nine divisions of the UAM, where nine engineering careers are offered. The object of this study was precisely to include in those programs the teaching of foreign languages, in accordance with financial possibilities of the institution. The resolution of the *Colegio Académico* brought in new support for this work.

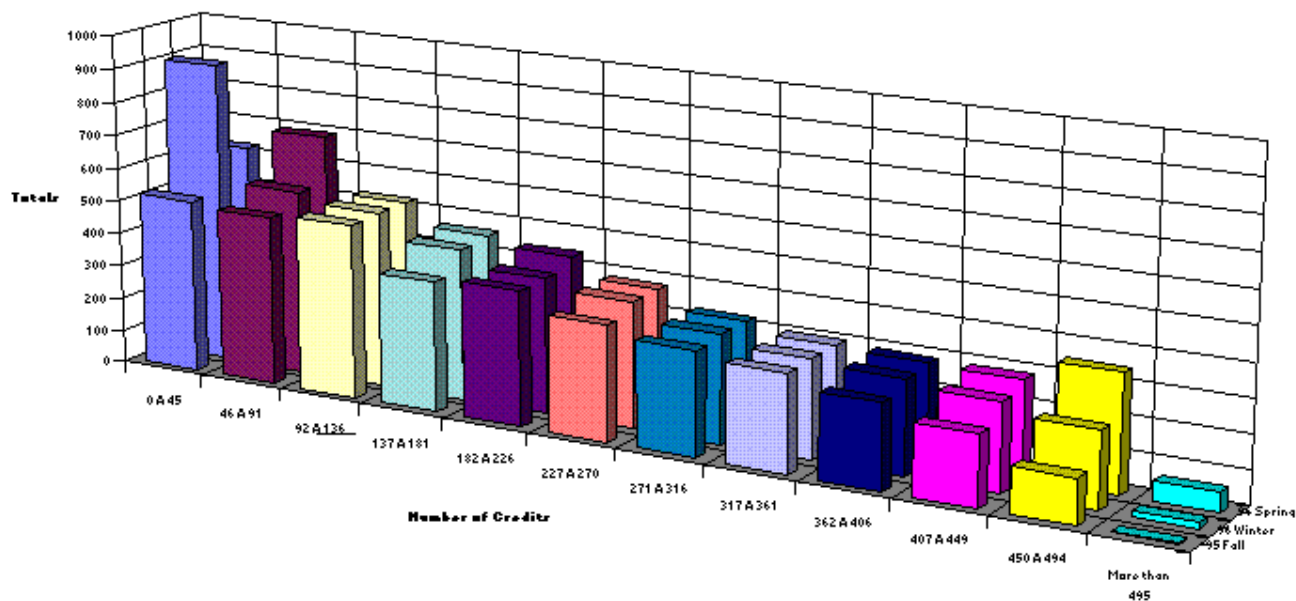


Figure 1. Active Students of the DCBI-UAMA in terms of passed credits.

The present situation

In the Campus Azcapotzalco of the UAM there is a Foreign Languages Center, which serves the students of three academic divisions; it was agreed that the Center would be managed by the Department of Humanities of the Division of Social Sciences and Humanities. Recently, the academic programs of this center were reformed. As a result of this reform, nine courses are offered, divided into three levels (basic, intermediate and advanced) for three languages: English (I to IX), French (I to IX) and German (I to IX). At present, some careers of the Division of Basic Sciences and Engineering include some of the courses offered by the Center as selective subjects with credits. However, it was reported that most of the students who select this subjects already know the language and their choice has the only purpose of easily adding some more credits to their record. Luckily, there are also students who take this courses with the genuine object of learning the language, without a reward in credits; however, they generally don't reach a satisfactory level. An average of two years indicated that 36 students per trimester, have taken one of these courses with credits and 90 without credits. Considering that the population of the Division is about 4,500 active students, those figures are certainly low. An important and fortunate fact is that recently, the facilities of the Center were largely increased and modernized, not only in terms of space but also of equipment.

The inquiry

The Commission in charge of the study, accorded as a specific object, to design a strategy, in order to give enough support to the students of the Division, to make them able to pass the test of foreign languages to be adopted as a graduation requisite. The resolution of the *Colegio Académico* clearly demands that a comprehension test of a foreign language shall be introduced to the bachelor programs, not the courses themselves. In fact, students might choose different ways to fulfil the requisite, including private classes. However, as a public institution, the University acquires the moral commitment of supporting its students to deal with the test, by means of courses conducted by the institution itself. The first step of the study consisted of specifying the regulations to conduct the courses. In this part of the analysis it was considered that allowing newly admitted students to take the foreign language courses would mean great investment for the institution. This is because in the first trimesters, desertion indexes are high. Certainly this is a problem that should be solved by any means, but since it was not the purpose of the study, for the moment the present conditions were considered. Bachelor's programs in the Division are divided in 12 trimesters; the first three ones form a block known as *Tronco General*, it consists of the same

subjects for all careers and deals mainly with basic sciences; other six trimesters are dedicated mainly to the learning of the sciences of engineering and the final three to engineering applications. After an analysis (figure 1), it was found that most of the desertions take place in the first six trimesters; after that, the number of students in terms of their stage in the career is almost uniform; the figure refers to 300 students per trimester. In terms of credits, reaching the sixth trimester means that the student has completed 270 out of the total 500 to 530 credits of the career. From this result, the commission proposed to complete 270 credits as a condition to take the foreign language courses. It means that the student will still remain another six trimesters in the University; that number corresponds to the six courses of the basic and intermediate levels offered by the Foreign Languages Center, as mentioned before. This suggests that an intermediate level should be a reasonable requisite. It is possible that in the future more advanced studies could be adopted as a requisite, but for the present stage, the intermediate level seems to be adequate. According to information provided by the Center, this level means about 40 % oral comprehension and more than 50 % written comprehension and expression.

After this first agreement, the commission decided to apply an inquiry, for it was considered important to obtain additional information not available in dossiers; for instance: Which is the level of foreign language comprehension of the students of the Division? Which is the foreign language that they know best and which they consider the most important? What way would they choose to get prepared for a test if the comprehension of a foreign language is included as a requisite for graduation?. Additionally, it was decided to search for differences in terms of age, career, gender, number of credits and timetable (Classes are offered all through the day in the Division but there are part time students that prefer evening classes because they generally attend a job in the morning).

A preliminary design of the inquiry was made and applied to four groups of students, in order to make sure that the questions were adequate. As a result of this, the definitive questionnaire was designed and applied to a representative sample of the active students of the Division.

The results

The inquiry was applied by the end of 1996 and the results were as follows:

1. No considerable differences were observed in the answers, in terms of age, gender, labor situation or number of credits.
2. Practically the whole of the inquired students are aware of the importance of a second language for their future professional development.

3. Almost 98 % think that the most important foreign language is English.
4. More than 95 % declared that, without regard to the level, they know English better than another foreign language.
5. Out of the sub-sample referred to in the previous point, the following self-assessed abilities were reported:

Oral comprehension

Excellent	0.97 %
very good	10.32 %
good	21.29 %
fairly good	26.13 %
minimum	23.55 %
none	17.74 %

Reading

Excellent	4.19 %
very good	15.16 %
good	31.29 %
fairly good	29.68 %
minimum	10.65 %
none	9.03 %

Writing

Excellent	0.65 %
very good	10.65 %
good	22.58 %
fairly good	26.68 %
minimum	20.00 %
none	16.45 %

Oral expression

Excellent	0.65 %
very good	6.45 %
good	21.94 %
fairly good	21.61 %
minimum	26.45 %
none	22.90 %

6. 89.26 % agree with the introduction of a foreign language test as a requisite for graduation, provided that the institution will offer support enough to the students for that purpose.
7. 42.64 % declared that if such requisite were introduced, they would get prepared with courses offered by the institution, 46.01 % would choose a combined way of courses offered by the UAM and private classes, 11.04 % would take private classes and 0.31 would take directly the exam.
8. 41.41 % would take the courses in the evening, 25.15 % in the morning and 31.90 % at any time, 1.53 % didn't answer.
9. One half on the inquired considered that the intermediate level is adequate for the requisite.
10. One half of the inquired answered that their ability for foreign languages learning is good and one third said that theirs is fairly good.

Considering the result described in point 3, as well as for the reasons presented in the introduction, it was

recommended that English teaching should be stressed and be made object for additional resources. Students that prefer French or German should be restricted to the present availability.

It is difficult to make an equivalence between the self-assessment made by the inquired students of their ability in English and the courses offered by the Foreign Languages Center. Therefore it was decided to proceed with it regarding oral comprehension, for rates in this ability are lowest. The equivalence is as follows:

Excellent (0.97 % of the inquired)	English VI passed (intermediate level)
Very good (10.32 %)	English IV passed
Good (21.29 %)	English III passed (basic level)
Fairly good (26.13 %)	English II passed
Minimum (23.55 %)	English I passed
None (17.74 %)	No course passed

This assumption considers that even those students who claim to have a very good oral comprehension level, should pass two courses to reach the intermediate level.

From the distribution of figure 1, it results an average of 1395 students with 270 passed credits, condition recommended as a requirement to be admitted to the English courses. From point number 7 of the inquiry results, it was assumed that out of the 46.01 % of the students that would choose a mixed way to pass the language requisite, only 10 % would take private classes and the remaining 36.01 % would take courses in the University; adding this figure to the 42.64 % that have already chosen this way, it results a total of 78.65 %. Applying this percentage to the 1,395 active students, a number of 1,097 results.

Not all this 1,097 students should take the six English courses at basic and intermediate levels. Applying the percentages mentioned before it results that:

195 students (17.7 %)	should take 6 courses
258 students (23.5 %)	should take 5 courses
286 students (26.1 %)	should take 4 courses
234 students (21.3 %)	should take 3 courses
113 students (10.3 %)	should take 2 courses
11 students (1.0 %)	shouldn't take any course

Other studies reveal that the students of the Division remain an average of 18 trimesters in the University, most of them for the first half of the program; normally they take 8 trimesters to complete the scheduled last 6 ones. Combining these figures, the number of students to be attended in one trimester should be:

$$(195 \times 6 + 258 \times 5 + 286 \times 4 + 234 \times 3 + 113 \times 2) / 8 = 567$$

Still it was considered that students should have a limited chance to take twice some of the courses. For this reason that figure of 567 was increased 33 % to obtain a whole number of 754. At present, as it was mentioned before, an average of 126 students are served; thus, additional resources must be obtained to cover the difference, 628 students per trimester. At a capacity of 30 students per class but estimating an average of 25, 25 new groups per trimesters should be opened. This means that 12 part time teachers should be hired, at a rate of two groups per teacher and exceptionally three.

Recommendations

Regarding the previous conclusions, the Commission issued the following recommendations:

1. To cancel the selective subjects of foreign languages with credits from the programs of those careers that still include them.
2. To include in the bachelor's programs the ability in a foreign language (English, French or German) as a requisite for graduation, in order to fulfil the resolution of the *Colegio Académico*.
3. To adopt the Intermediate Level offered by the Foreign Languages Center of the Campus (English VI, French VI or German VI) or its equivalent, for the foreign language requisite.
4. To give support to the students in order to fulfil the requisite, by means of courses, without credits, to be offered by the Foreign Languages Center and according to its present programs, under the following regulations:
 - The student shall have 270 credits to be admitted.

- An exam shall be applied to determine the course in which the student will be newly admitted.
 - Recurrence shall be limited
5. To hire part time teachers to attend 25 additional classes per trimester with an average of 25 pupils per class
 6. To program the courses trimestrally, as a function of the demand; most of them (60 %) in the evening.

Conclusions

As a result of the study, it is considered that promoting the learning of foreign languages by the students of the Division becomes within the possibilities of the Institution. Luckily, facilities and equipment are sufficient, pending the hiring of teachers to strengthen the attendance of classes. Planning of this program should be revised periodically.

It is thought that this experience may be interesting for other universities and schools of engineering with similar problems and social-economic context.

References

- [1] Resolutions of the *Colegio Académico* of the Universidad Autónoma Metropolitana (1975-1978)
- [2] Program of the Center of Foreign Languages of the Universidad Autónoma Metropolitana Azcapotzalco (1995).
- [3] Final report of the *Commission in charge of a study for the comprehensive teaching of foreign languages in the Division of Basic Sciences and Engineering of the Universidad Autónoma Metropolitana Azcapotzalco* (1997).