

# Reflection on the Use of Foreign Language Courses in Engineering, Technology and Science Teaching: Experience in Lebanese Universities

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**Abstract:** *Most reports on training students show us that the historical fragmentation between scientific training and language teaching is no longer desirable. The majority of curricula suggest the integration of language courses in scientific disciplines which will stamp the transposition of relevant knowledge and its integration into vocational training [http://Afneus.org]. Following an overview of the different scientific specializations in the third world countries and in Europe, it is noted that educational systems stumble, among other things, on shortages of communication and terminology in foreign languages [1]. One shall suggest a new convincing, coherent training prototype to integrate these two fields of knowledge. In this descriptive research, we recommend the Lebanese model in the education at school and university, as we illustrate in subsequent paragraphs.*

**Keywords:** Science Education, School Curriculum, University Curriculum, Foreign Language

## 1. Introduction

Knowledge is assessed in the ability to verbalize and externalize. To enable the development of trade, in its report in 2006, AFNEUS, the National Federation of Scientific University Students, considers it essential to a student in science to acquire language skills in parallel with those of the scientific field. "A student has more than its need for professional integration to develop its range of languages in his field of study"[2].

However, in an aim to preserve the native language, its culture and its traditions, its defenders are fighting against the introduction of foreign languages as languages of instruction in science subjects without collecting as much impact on a benevolent and modernized training. "We are talking about an internal consistency requirement which implications are strictly educational, is not always clearly perceived initially by the protectors of the use of national languages at school"[3].

Our study was conducted in schools and universities in Lebanon to categorize their education system in science subjects according to language teaching in purpose to reveal their system impact on students' social and professional openness factor.

### 1.1 Problematic

The Lebanese education system is mainly concerned in coordinating different disciplines and giving them a common purpose.

Science education in schools aims to acquire the student a coherent set of knowledge to pursue university studies and give basic training to qualified citizens, aware and well adapted to life in a modern society.

As to globalization era, a special attention is to be paid to

systematic instructional strategies involving a foreign language in response to academic and professional needs.

### 1.2 Research questions

The aim of this topic is to facilitate the reflection on the teaching of science and mathematics in a foreign language as non-linguistic discipline. The questions imposed are:

- What is the impact of introducing a foreign language in scientific curriculum?
- What is the impact of teaching sciences courses with a foreign language?

### 1.3 Research Methodology

Our research is related to a descriptive evaluation type, which, from a problematic situation of socio-demographic nature, here teaching scientific subjects, develops questioning to frame the variables involved in this study [4]. As a result, we have proceeded by shedding the lights on representative samples of this situation to draw rigorous explanations.

Writing about this topic was reached gradually after researching the evolution of education at Lebanese school and university.

## 2. Context and Background of the study

### 2.1 Education systems in science at Lebanese public and private schools:

In Lebanon, "The school pluralism is somehow a reflection of social pluralism"[5]. This statement, reflects the Lebanese reality of the 21st century. Education in Lebanon is divided into private education in general, within national or foreign communities, religious or secular public education and born with Independence in 1946.

The continued development of the curriculum is designed to fit on one side, the capabilities and abilities of the Lebanese citizen and, on the other side, the needs of society and market requirements of employment. Hence, a suitable place for scientific studies is reserved.

In general, the teaching of science subjects: Mathematics, Biology, Chemistry, Physics, Earth and Life sciences, and even the activities in the school curriculum, are presented in a foreign language which may vary from one school to another. In English schools that language is English, those in French is French. Recent statistics prepared by the Lebanese CRDP [National Centre for Research and Development linked to the Ministry of Education and Higher Education. The Lebanese official program of the National Research and Educational Development Lebanese Center (CNRDP)] shows that the French is ahead on the English in this regard, even if the latter experiencing significant expansion in all business sectors.

The CRDP in a publication in February 2016 proposes the distribution of weekly hours of teaching in complementary cycle as follows (Table 1):

**Table 1:** Weekly distribution hours of teaching in complementary [Complementary cycle includes grades EB6 up to] cycle

Courses	Private schools		
	Public schools		
	Mother tongue	1 <sup>st</sup> Foreign Language	2 <sup>de</sup> Foreign Language
Literature/Grammar/Conjugation	6	6	3
Mathematics		6	
Science/Physics/Chemistry		4	
History/Geography/Civics	3	2	
Technology/Computer		2	

This table shows the balance of foreign languages in the Lebanese curriculum. In addition to teaching the mother tongue and the main foreign language, private schools have integrated into their school curriculum three sessions per week of teaching a second foreign language; English in Francophone schools and French in Anglophone schools. Also, regarding certified schools in the Francophone systems, a third foreign language on the menu that is Spanish.

Regarding public schools, they are highly frustrated by a budget constraint, therefore, the second foreign language is optional and depends on the financial intervention of the parents. Under the best conditions, the number of hours per week is limited to one.

From the above, it seems obvious that foreign language teaching sessions are far more amplified than those in the mother tongue (at least 20 hours of foreign languages and 9 hours of mother tongue). Consequently, students are more likely to perceive, understand, listen, memorize, understand and even reason following foreign cultures.

Namely, for the primary and secondary levels, although the program classification differs (teaching in secondary science varies from 9 to 16 hours per week), the main foreign

language remains the language of instruction for science subjects.

Regarding foreign language courses, they were designed with the aim of being capable of providing students with a multidisciplinary knowledge and promoting a multilingual culture. This multilingual trend is closely linked to the development of teaching and learning quality in a strategy of opening towards Western and Arab market.

## 2.2 Education systems in science at Lebanese Universities

The majority of faculties of engineering, science and technology in Lebanese universities offer courses in the field of modern languages (English or French) that mandatory enter their disciplinary curriculum. Note that the language of instruction for science subjects is predominantly French in the Francophone universities and English in Anglophone ones.

Pointing out that Lebanese university scientific sectors follow the guidelines of the Ministry of Higher Education in addition to the instructions of the Order of Engineers for engineering faculties. Although the curricula of scientific specializations are regularly offered by the department, their conceivable implementation depends systematically on the resources allocated by each institution.

However, teaching conditions are different from one institution to another and even within the same institution, following each specialization.

In this study, we looked in the period between 2000 and 2015, on all engineering and science programs within seven typical Lebanese institutions: Holy Spirit University of Kaslik (USEK), Saint Joseph University (USJ), Lebanese University (UL), Lebanese American University (LAU), American University in Science and Technology (AUST), American Open University (AOU) and American University of Beirut (AUB).

### 2.2.1 Case of francophone Universities

Based on their belief that foreign language courses such as English and French are now a required skill which deploys a better opportunity to join a professional career, all students are requested to take a placement test in French and English. Intermediate language courses will be required as conscientious standards. Although these intermediate courses are not counted among the numbers of graduation credits, they remain an essential condition for joining a specialization in the so-called universities.

Moreover, like it or not, several studies in economics, science and diplomacy [<https://www.elanguest.fr/content/Le-blog-de-lecole/anglais-langue-internationale.htm>] admit that English is the language of international communication from the Second World War. English is also the language of information and research. Indeed, English is the main language of books, newspapers, business, science, sport, music and advertising, etc...[6]. "English over time has replaced French as the lingua franca [Lingua franca used as means of communication between people of different languages]".

Theodore Roosevelt appealed that, "If you do not need English today, it is probably only a matter of time."

In their desire to ensure their graduates a better chance in the international field of work, Francophone universities have introduced at least one mandatory English class in courses in science, engineering and technology.

In accordance with the syllabus of these courses [Syllabus are available by contacting [marie-therese.saliba@umontreal.ca](mailto:marie-therese.saliba@umontreal.ca)], students are supposed to investigate original questions. In other words, these courses should strengthen their sense of search, sort and draw the correct answer of a digital or physical magma information widely available on the English allocated sites.

These English language courses, mainly dedicated to research and science, are listed and rated according to their syllabus distributed to students by the teacher at the beginning of the academic year and displayed in the catalog of their specialization on the site of their university.

### 2.2.2 Case of Anglophone Universities

As for English universities, courses of science and technology in science subjects are taught in English. In addition, the majority of these universities have integrated 3 English classes recorded and catalogued in their curriculum of science, engineering and technology. Namely, only the upgrade English Test is administered to students in the faculties of science, technology and engineering.

As example of language courses:

- Fundamentals of a professional written report: This course is devoted to scientific writing reports, letters, professional e-mails will, preparation and drafting of a CV, scientific letter, coverage of a report, etc...
- Fundamentals of Oral Communication: This course is dedicated to oral presentations, conference preparation, plenary sessions, etc... Considering that a public presentation is more formal than a simple conversation, the speaker should inspire confidence and credibility, a formal business communication is strongly required.
- Professional Communications: This course covers professional communication with practical expression in the exposition and persuasion. The focus is on using the language and organizational skills in preparation, delivery and evaluation of different types of correct and effective oral presentations: Job interview, negotiating a project, persuasion of a quotation, etc....

### 3. Findings on the Effect of Foreign language in scientific fields at the Universities

The foreign language courses in the science disciplines, are simultaneously designed for university students nearing graduation and graduates working on their thesis. They give them the opportunity to improve their writing skills and develop critical thinking. These language courses are trying to help students to achieve greater competence in both oral and written. They develop thinking and discussion by stressing the responsibilities and structured reasoning. Note

that the language considered foreign in Francophone universities is English, and French for Anglophones.

Let us add that these courses prepare students for scientific and advanced multilingual communication while focusing on the specialized skills of engineering, science and / or technology. These students are primed to projects that force them to seek and extract relevant information from various cosmopolitan sources. In the project delivery process, for example, the students will practice different skills developed for the collection of data through interviews and questionnaire surveys, integrating and presenting information (in oral and written form), time management and group interaction.

The various oral activities such as presenting a proposal or a report are designed to strengthen oral and communication skills in a foreign language and therefore reinforce the student's self-confidence to express himself/herself; futurists and professional skills for their career.

Teaching a foreign language or in a foreign language is based on the exposure to traditions and customs, cultures, civilizations, references and knowledge of the language. With this breadth of knowledge, our students will be better prepared to confront the local labor Arab and Western market.

This bold policy concerning the development of a multilingual education system, converges with the statement of Morin [7] who distinguishes: "The competence [...] in the way of the general ability of a student to demonstrate the achievement of program objectives and that makes him/her suitable to integrate into the labor market or undertake university education and skills, which are the particular skills and abilities to meet the specific requirements of a job, a job function or a particular university program".

Our academic leaders: Administrators, inspectors, trainers, educationalists and teachers are vigilant that a man of science, technology and engineering, as employed or self-employed, shall, throughout his career, use a foreign language to fulfill his tasks and responsibilities. Including but not limited to:

- Participate in a conversation or meeting while being able to fluently speak in a foreign language commonly, English and / or French.
- Present and defend his points of view in public.
- Provide plenary persuasion strategies, negotiation and argumentation
- Collaborate with engineers and other specialists
- Write formal emails, formal letters, complaints etc...
- Possess a vocabulary from a technical field
- Create and develop projects, their planning, progress, conclusion and recommendations.
- Understand, analyze and criticize complicated projects, strategies, reports and techniques:
  - Describe and understand technical drawings and graphics
  - Speak of different materials and their properties
  - Discuss equipment and technology

In the spirit concerned with ensuring their graduates a broad horizon of competence, expertise and especially life skills, courses of foreign languages have been developed and put into action with vigilance by different universities from sixty years ago. Moreover, the vocation of teaching science subjects in a foreign language will push the student, and later university student, to be accommodated, shall we say, knowledgeable, technical terms of each specialization and its typical methods. Thus we avoid a deep remediation intervention during the specialization. Through this approach, the student will benefit in terms of time and knowledge.

#### 4. Conclusion and Recommendations

The Ministry of Education and Higher Education of Lebanon in collaboration with the school and university educational institutions in his reform workshop, makes efforts to achieve the following: On one hand, encourage the students to pursue higher studies in Lebanon or in a foreign country, and on the second hand, facilitate the job search on the Lebanese, Arab and Western market.

This objective will be achieved by learning at least one foreign language in parallel with the mother tongue language and the teaching of science subjects in a foreign language.

To do this, official programs hope that the inclusion of foreign languages in the school and the university curriculum and teaching science subjects in a foreign language, are proving a real social and professional openness factor.

In summary, this intrinsic approach prepares students for international mobility and this by improving their linguistic and scientific skills.

The Lebanese education system, at school and university, look to this major languages in the ultimate goal of ensuring a reliable graduates underbody of language and technical skills to succeed and join a profession in a world where competitions are ferocious.

Indeed, teaching science subjects in a language other than mother tongue aims to enhance the language and trans-disciplinary skills of students. According to the report of the General Inspectorate of Education in [8] on the teaching of mathematics in a foreign language "[...] this teaching is the convergence between the two disciplines and must precisely contribute to capacity building in these two disciplines. It is not about translating the course in a foreign language nor providing "as" a course designed primarily for students of another country".

Modern education, will deploy content and educational schemes to improve students' skills in languages and linking, to promote "a new and complementary environment from that of the living language" [9].

This multilingual process has had several international educational organizations to reconsider their educational system. Proof of this is the AFNEUS (The National

Association of Federal scientific university students) in its research in the European environment, said "a lack of language skills of students in their disciplinary field (specific to the sector) at the end of their curriculum". This finding led them to decide that it will reconsider the establishment of adequate teaching of modern languages in sciences education.

This conclusion was confirmed by the educational organization EMILE (Teaching an integrated material with a foreign language). In its research in schools in Europe, EMILE demonstrates that teaching foreign languages goes beyond the requirements of a traditional language teaching. It requires a human resource development, appropriate teaching and learning materials [1].

Nevertheless, [3] ensures that the predominant role of the mother tongue does not diminish the need for multilingual education. "[...] On the contrary, no language, regardless of its power, shows interest today to withdraw into a ghetto identity or to be locked in face-to-face rock and uneven. Multilingualism is not confrontation but complementary. This is why it is undeniably a cause common to all forms of humanism."

With this in mind, we wish to support the importance of multilingual education without destroying the place of our mother tongue and this to ensure the emotional, cognitive and cultural development of the student.

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### Author Profile



**Marie-Therese Saliba** received my M.S in Computer Engineering in 1990 from the Saint Joseph University- (ESIB) High School of Engineering, Lebanon. In 2011, I received my PhD in Didactic of science, mathematics and technology from the University of Montreal, Canada. A Post graduation diploma in learning and teaching in higher education from Chester University, UK in 2013. I have 25 years' experience in higher education in the fields of engineering and higher education in addition of my freelance electrical engineering. I participated in many colloquiums as a member of scientific comity, organization comity and as a reviewer.



**Randa Saliba Chidiac.** Received my Master Degree in Translation in 2000 from the Holy Spirit University of Kaslik-Lebanon, became a sworn translator at the Court of Law in 2003 and started teaching English for intermediate and masters students at the same University in 2004 in parallel with my freelance translation (Arabic-French- English and Spanish). In January 2012, I received my PhD in Science of languages and Traductology. In 2014, I became a full time teacher at the Holy Spirit University, at the Faculty of Letters with the title of Assistant Professor. I participated in many seminars and conferences.