

## Evaluation of the Undergraduate Program in Higher Education: the case of the Science and Mathematics Department at the Faculty of Education, Lebanese University

**Suzanne EL TAKACH**  
Lebanese University

**Muhammad RAWAS**  
Lebanese University

**Mohammad DOKMAK**  
Lebanese University

**Abstract:** The Faculty of Education is currently in the phase of revising its LMD programs. In order to modernize and to keep in track with the latest trends in Education, the Science and Math department made an in-depth study that involves 30 teachers and 9 trainers, who presented their ideas for innovation, suggestions for new courses and improvement in the present courses. A large scale survey was done on undergraduate students, in order to collect ideas about the taught courses, students' skills and courses learning outcomes, as well as needs and suggestions for new courses. Qualitative and quantitative data were collected a) from 1005 students-filled questionnaires that assess 33 courses from the Science and Mathematics Department and lasted over 6 semesters, as well as practicum courses at schools and b) a focus group of 34 students, in their last semester, filled a questionnaire detailing the taught courses, new courses and comments about their learning during their 6 semesters at the Faculty. Teachers suggested new courses like STEM and science and industry, proposed new specializations, such as science and math teacher preparation for middle classes, and redistribute some current courses. Students in their last semester, for instance, were satisfied with the taught courses related to their specialization, they complained from the redundancy in some courses like psychology and general education and they emphasize on taking into consideration their opinions and suggestions in the assessment of the LMD program.

**Keywords:** Assessment in higher education, LMD program, Quality of teaching

### Introduction

The term assessment is used in the literature to describe the collection and use of information and data about educational programs to improve student learning. This is usually obtained by using questionnaires (Feistauer & Richter, 2017).

Stitt-Bergh (2015a) designed an assessment initiative to assess learning outcomes based on three frameworks: Participatory Evaluation, Evaluation Capacity Building (ECB), and Sociocultural Learning Theory. The participatory evaluation is a type of evaluation that describes a cooperative process in which the faculty and evaluation experts participate in the evaluation process. "ECB is essentially training faculty how to do learning outcomes assessment and how it can be useful. An institution can use a combination of different strategies to build faculty and administrator capacity to do outcomes assessment" (Stitt-Bergh, 2015a, p. 9).

An institution can use a combination of different strategies to build faculty and administrator capacity to do outcomes assessment. The third type is the sociocultural learning theory. This theory is not only concerned of the measurement of student learning. "By taking a sociocultural learning theory approach, the assessment

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specialist's role as an "assessment teacher" is dynamic instead of a one-way transmission of knowledge." (Stitt-Bergh, 2015a. p. 11).

Also, Rickards and Stitt-Bergh (2016) cited three challenges in higher education evaluation: first, the issue of ethical treatment of college students: institutions of higher education should find methods to protect student privacy and students should be informed of how the data and information gathered about their work are used. A second challenge is negative reaction by some faculty. "The negative reaction leads to a lack of engagement and reluctance to use findings, which runs counter to an assessment for improvement model that relies on collaborative participation in evaluative practice." (p. 17). Third, "the nature of the college context presents challenges to inquiry". Since the evaluation instruments are prepared by faculty members for specific purposes and the data may be used to answer many questions related to students learning. This practice may complicate the analyses.

Stitt-Bergh (2015b) highlighted features of graduate programs at research universities that have an effect on student learning outcomes assessment. She offered strategies for assessment coordinators/leaders who work with graduate programs. Also, she summarized the roles of evaluators in higher education: "In higher education, the evaluators' roles include documenting and facilitating use of results, leveraging technology and existing data, negotiating what becomes public information and coauthoring with faculty". Stitt-Bergh et al. (2016, p. 123 ).

Rivza et al (2015) evaluated the higher education programs in Latvia and the role of the universities in economic development. The study concluded that study programs correspond to their objectives. Also, students are involved in the decision making process. "At the same time, more critical thinking, as well as foreign language skills, should be integrated into the study process of regional higher education programmes."(p. 643). Another conclusion of the study is that higher education in Latvia is a sustainable and competitive system of social existence, having the ability to integrate into the higher education and development processes of Europe and the world.

Powell (2011) sums up much of the critics' positions of higher education evaluation: "Outcomes assessment is an odd business. It is not to the credit of higher education that we have tolerated this external assault on our work. Its origins are suspect, its justifications abjure the science we would ordinarily require, it demands enormous efforts for very little payoff, it renounces wisdom, it requires yielding to misunderstandings, and it displaces and distracts us from more urgent tasks, like the teaching and learning it would allegedly help." (p. 21)

Noteworthy to add that the Supreme Commission for the Development of Curricula and Programs at the Lebanese University presented 5 steps in order to implement successfully the LMD program in terms of: legislation, teaching staff, administration, faculties' libraries, buildings and research centers and evaluation of the new LMD system (from the PowerPoint on the official website of the Lebanese University, n.d, slide 22).

At the the Faculty of Education, some courses have been assessed, like Nature and History of Science and Health Education courses (e.g., El Takach, 2018a; El Takach, 2018b). But no study till now has assessed all courses of the Science and Mathematics Department. Because the Faculty is in the midst of revising the LMD curriculum, a curriculum reform committee was formed amongst of head of departments; its task was to submit a detailed report about the obstacles, difficulties and challenges faced by the implementation of the LMD system at the Faculty. The Science and Mathematics Department took part actively in the LMD committee by collecting and communicating teachers', trainers' and students' suggestions and feedback. The authors' main goal was to assess courses taught by science and Mathematics teachers for all majors. Thus, the study research questions are:

1. What are students' overall assessment about the LMD courses, in terms of planning, presentation and teaching of the course, teacher-student interaction and assessment?
2. What are teachers' and students' feedback and suggestions for improvement?
3. In students' opinions, what are skills acquired at the end of their teacher preparation?

## **An Overview: the Faculty of Education and the LMD System**

Lebanon has a high literacy rate: in 2015, according to the World Bank, it was around 99 % for both male and female youth (as cited in Loo and Magaziner, 2017). In addition, the European Commission (2012) report on higher education in Lebanon, stated that Lebanese higher education is characterized by a historical openness to the outside world. It is hard to find one institution that does not have a convention or an agreement with one or more institutions in the region, in Europe, in Canada or in the United States. Moreover, during 2000-2001,

more than 60% of all Lebanese higher education students in Lebanon were enrolled at the Lebanese University (Loo and Magaziner, 2017). Finally, during 2015, more than 14000 Lebanese students were seeking degrees abroad, according to UNESCO Institute of Statistics (UIS).

In 2012, 74000 students were enrolled at the Lebanese University (Official Website of the Lebanese University). And as stated by Ayoub (2018), the total number of students increased and reached 79000 students. Furthermore, the Faculty of Education is the foundation of the Lebanese University or *l'Université Libanaise*, the only public university of higher education in Lebanon, and it was known as the High Teachers Institution when it was established in 1951, before being renamed the Faculty of Pedagogy in 1967. The Faculty mission is educating elementary and high school teachers, in addition to other pedagogic frameworks (Lebanese University Official Website). The Faculty of Education is divided into 3 buildings, disseminated in Beirut area: Deanery, Branch I and Branch II. During the academic year 2015-2016, the number of students stands at 2137 students (undergraduate and Master students). The total number of students is 898, 807, and 432 in Deanery, Branch I and II respectively.

The 1999 Bologna Declaration has been about improving transparency between higher education systems, facilitating recognition of academic qualifications, promoting academic mobility, and increasing exchange between institutions and individuals. Bologna defined six main objectives; two of these objectives are to promote mobility by overcoming legal recognition and administrative obstacles, and to adopt a system of easily readable and comparable degrees. Similar to American and Bologna-reformed European systems of higher education, Lebanese higher education utilizes three progressive cycles: bachelors level (3 years), masters level (2 years), and doctoral level (3 years), or the French model, *licence*, *master*, and *doctorat* (LMD). The Lebanese University began implementing this three cycle structure in their faculties in 2005, though implementation has not been immediate or uniform. But it is not until the academic year 2008-2009, the Faculty of Education shifted to the LMD system. For instance, a three-year bachelor's degree is generally 180 ECTS (European Credit Transfer System credits). Noting that, the language of instruction in Lebanon can depend on the institution attended, but programs of study are typically offered in Arabic, English, or French, such as the Lebanese University, the French-structured institution.

### **Science and Mathematics Pre-service Teacher Preparation**

The Faculty of Education is an applied faculty. Besides a Bachelor Degree for Science and Mathematics Teachers for the elementary level, the faculty offers 10 various specializations, such as English Language, Early Childhood, and Physical and Sports Education teachers for the elementary level. Noteworthy to say that, the Faculty prepares pre-service teachers mostly for the public schools for elementary level. Science and Mathematics disciplines are taught in a foreign language (French or English), for both public and private sectors.

The Bachelor degree (Licence) duration is 3 years and it spans over 6 semesters. The total number of credits is 180. The semester spanned over 13 weeks. Students can register from 18 until 30 credits per semester. In science and Mathematics, the total number of courses is 52. Each semester, students can attend 8 courses. These courses vary from compulsory, optional and free ones. They ranges from theoretical (for example, Development of Educational Thought), or applied (for example, Classroom Observation), or practical (such as Technology in Teaching). Some courses are compulsory (specialized track) and some are optional. Finally, science and Mathematics students learn the didactics and the specialization courses in a foreign language, French or English, while social and general education in Arabic.

### *Student Assessment*

Based on the LMD system, students at the Faculty of Education do a partial exam or formative assessment and a final exam or the summative assessment which is a paper and pencil examination, both exams are used in the assessment of the student in a given course. The partial exam comprises class attendance, quizzes, class presentations and projects. It counts 40% of the total score while 60% are left for the final exam.

## **Method**

### **Sample and Participants**

The present study is a part of a research project on assessing the LMD program for the Science and Mathematics Department at Branch I. The department comprises 57 teachers and 23 trainers and with an approximate number of 200 students enrolled during 2015-2016. It is the biggest Department at the Faculty among the Languages, Humanities, General Education and Psychology Departments. A large scale survey is used in order to collect data about the taught courses, students' skills and courses learning outcomes, as well as their needs and suggestions for new courses.

The questionnaires used to collect students' attitudes towards the courses and training in this study were adopted by the Faculty; the department discussed these questionnaires with teachers and made some changes on some indicators, in order to adapt it for the department needs.

The study sample involves 30 teachers and 9 trainers (5 Mathematics and 4 Science). Teachers as well as their students were informed one day in advance of the questionnaires administration. Students in majors such as early childhood education, humanities education also took part of the survey.

For the data collection, 5 out of 7 of the board members of the Science and Mathematics Department distributed the questionnaires during the 12th week of the winter semester in 2016. In this way, the authors were sure that all students finished their assignments and they could have a clear opinion of the taught courses at the end of the semester. And, one week before students would have left off, before the final examinations.

The 3 questionnaires used within this study were sequentially addressed to assess a) courses, b) teaching practice and c) students' attitudes towards courses during the 3 years. Students assessed the courses in terms of: planning, presentation and teaching of the course, teacher-student interaction and assessment. Questionnaire 1 and 2 consisted of 23 closed-ended items; some were of Likert scale type and 2 open-ended questions. Questionnaire 3 consisted of 10 questions, 4 questions were open questions about skills gained, suggestions for improvement and new courses.

All courses related to the Department (33 courses and 3 training practicum) were assessed by students in all semesters. For instance, Descriptive Statistics, Environmental Education and Health Education are compulsory courses taught by teachers of the Science and Mathematics Department for all majors. Results related to 20 courses and the 3 training practicum, taught in semesters 1, 3, and 5 are displayed in this paper. Quantitative and qualitative data emerged from a) 1005 respondents for the courses filled by students of different majors and b) 39 respondents filled by science and Mathematics students in their 5<sup>th</sup> and 6<sup>th</sup> semesters for the training.

As for the focus group, they were 34 students (15 science and 19 mathematics pre-service teachers in their last semester). They were administered a questionnaire in their last semester, during the 12 week of the spring semester 2016. All filled in a questionnaire detailing all the taught courses during their 3 years at the Faculty, and they provided suggestions for new courses and comments about their learning.

## **Results and Discussion**

### **Results related to Research Question 1**

This section displays students' assessment of the courses in terms of: planning, presentation and teaching of the course, teacher-student interaction and the course assessment.

#### *Planning*

In general, 82.3% of students from all majors enrolled in science and Mathematics courses agreed that teachers indicate the course objectives and the methods of evaluation during the first session. Moreover, all students said that their trainer in teaching Science and Mathematics attends classroom observations and students' explanation in schools 3 times (Table 1).

Table 1. Students' attitudes towards the courses and training

Indicators	Teacher (N=1005)		Trainer (N=39)	
	Yes	No	Yes	No
Teacher sets the objectives of the course and the methods of evaluation at the beginning of the semester	827 82.3%	178 17.7%	-	-
Teacher follows the course syllabus distributed to students at the beginning of the semester	804 80%	201 20%	-	-
Teacher /Trainer is committed to do make up sessions	807 80.3%	198 19.7%	30 76.9%	9 23.1%
Trainer Keeps track of the work of student trainees in schools				
Trainer takes into account the scheduled and agreed dates with student trainees	-	-	36 92.3%	3 7.7%
Trainer is committed to attend classroom observations and explanation in schools 3 times	-	-	39 100%	0

*Presentation of the Course, Teaching and Training*

Overall, in Table 2, students were satisfied with explanation; 73.2% said that their teachers explained always the lecture clearly, while 31.3% said that teachers use sometimes different teaching methods, such as discussion (28.2%) and ICT (13%), compared to 42.3% of students saying that their teachers never use ICT during instruction. In terms of communication, only 44.4% of students highlighted that teachers communicate with them about tasks, projects and literature to read, via e-mail and Whatsapp.

As for trainers, 35.9% of students indicate that sometimes, trainer displays lesson plan models and preparations and discuss them with students trainees, 69.2% stressed that trainers listen always to the trainee, discusses the contents of the reports and their Portfolio.

Table 2. Students overall assessment of teaching courses and practice

Indicators	Teacher			Trainer		
	Always	Sometimes	Never	Always	Sometimes	Never
Teacher explained the lecture clearly	736 73.2%	205 20.4%	64 6.4%	-	-	-
Teacher/Trainer spurred discussion	661 65.8%	283 28.2%	61 6%	-	-	-
Teacher uses teaching tools such as Power point, LCD, ...	449 44.7%	131 13%	425 42.3%	-	-	-
Teacher communicates with students via e-communication (EMAIL, WHATSAPP, ...)	448 44.6%	259 25.8%	298 29.7%	-	-	-
Teacher uses different teaching methods	495 49.3%	315 31.3%	195 19.4%	-	-	-
Trainer gives the student trainee enough time to show how they explain lessons	-	-	-	29 74.4%	10 25.6%	0
Trainer displays lesson plan models and preparations and discuss them with students trainees	-	-	-	13 33.3%	14 35.9%	12 30.8%
Trainer listens to the trainee, discusses the contents of the reports and their Portfolio	-	-	-	27 69.2%	9 23.1%	3 7.7%
Trainer organizes his/her lectures in terms of sequence of concepts and ideas and linking them with examples of daily life?	-	-	-	21 53.8%	16 41%	2 5.2%

Teacher-Student Interaction

Table 3 describes how was the class interaction between teachers and students based on students' answers; teachers and trainers always manage the lecture calmly (76.3%) and trainers always create an atmosphere distanced from tension (71.8%). Moreover, 76.9% of students said that their trainer shows respect for the trainee for his or her efforts in preparing and implementing lessons.

Table 3. Students overall assessment of class interaction

Indicators	Teacher			Trainer		
	Always	Sometimes	Never	Always	Sometimes	Never
Teacher/Trainer deals with the students/trainees without distinction between them and with respect	830 82.6%	115 11.4%	60 6%	29 69.2%	7 23.1%	3 7.7%
Teacher's lectures are characterized by dialogue and acceptance of others	765 76.1%	189 18.8%	51 5.1%	-	-	-
Teacher/Trainer manages the lecture calmly and away from the chaos/ atmosphere is distanced from tension and interactive work is dominant	767 76.3%	193 19.2%	45 4.5%	28 71.8%	6 15.4%	5 12.8%
Trainer shows respect for the trainee for his or her efforts in preparing and implementing lessons	-	-	-	30 76.9%	7 17.9%	2 5.2%

Motivation and Assessment

In Table 4, students' answers illustrate teachers and trainers modes of assessment; 63% pointed out that their teachers adopt always a method of teaching that motivates them to continue learning, and 43.6% indicated that their trainer gives them always positive feedback during lesson explanation in schools.

As for class quizzes, 20.6% said that teacher never corrects questions of continuous assessment tests in the classroom, and 17.4% indicated that teacher never announces the results of periodic tests without delay (Quiz). On the other hand, 74.4% said that trainer always correct their work (lesson preparation, reports, portfolio ...) and sets appropriate scores.

Table 4. Students overall assessment related to motivation and course assessment

Indicators	Teacher			Trainer		
	Always	Sometimes	Never	Always	Sometimes	Never
Teacher corrects questions of continuous assessment tests in the classroom	606 60.3%	192 19.1%	207 20.6%	-	-	-
Teacher announces the results of periodic tests without delay (Quiz)	653 65%	177 17.6%	175 17.4%	-	-	-
Teacher adopts a method of teaching that motivates students to continue learning	633 63%	230 22.9%	142 14.1%	-	-	-
Trainer gives positive feedback to the trainee while explaining the lesson	-	-	-	17 43.6%	10 25.6%	12 30.8%
Trainer helps the trainee to do self-assessment	-	-	-	19 48.7%	13 33.3%	7 17.9%
Trainer corrects the work of the trainee (lesson plan, reports, portfolio ...) and sets appropriate scores	-	-	-	29 74.4%	7 17.9%	3 7.7%

Table 5 shows that 59.7% indicated that they benefit largely from the course and that 91.9% like to continue learning the courses in English or French.

Table 5. Course overall students' feedback (N=1005)

Indicator	Very much	Somewhat	Not at all
I have benefit a lot from the course	600 59.7%	328 32.6%	77 7.7%
I would like to learn the course	Arabic 81 8.1%	Foreign language (English or French) 924 91.9%	

**Results related to 6<sup>th</sup> Semester Science and Math Students**

*The Focus Group*

Figure 1 illustrates the focus group answers to courses they learnt during their 3 years-bachelor-degree at the faculty. Descriptive measures for LMD courses have a total score that ranges from 1.16 and 2.68. In general, students presented an above and/or an average answer about their teacher preparation. For instance, for their major, teaching science and teaching mathematics courses came in the first place. Moreover, students preferred courses of their minor in pure science courses for math students and vice versa. But, science students have a below score for teaching mathematics courses as their minor.

Also, it shows that students scored the highest free courses (e.g., ethics of teacher profession, music education..) and humanities courses. As for general education, science students have an average answer to relevant courses, unlike mathematics. On the contrary, in psychology and technology in teaching, science and math students presented a score below the average.

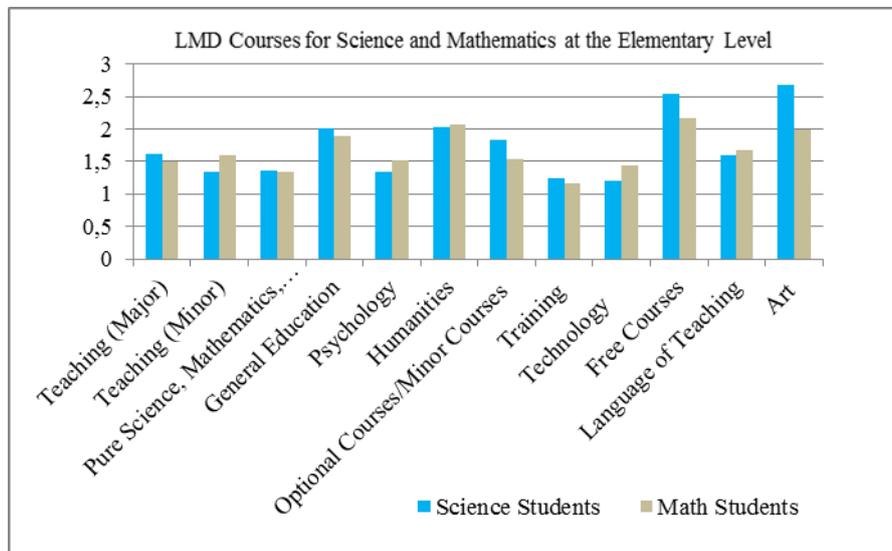


Figure 1. The focus group course mean spanned over the 6 semesters

The focus group did not find relevant pure content knowledge for their careers. Students ticked the appropriate Likert scale items. Students' answers are configured according to mean of 1.5 (Table 6).

Table 6. Overall distribution of courses per credits

LMD Courses for Science at the Elementary Level	No of Credits/ All Semesters	Science Students Mean=1.5	LMD Courses for Mathematics at the Elementary Level	Math Students Mean=1.5
Teaching (Major) (9 courses)	26	1.61	Teaching (Major) (9 courses)	1.5
Teaching (Minor) (3 courses)	12	1.35	Teaching (Minor) (3 courses)	1.6
Pure Science, Statistics and Biology (10 courses)	40	1.36	Pure Mathematics, Statistics, Computer Programming and Informatics	1.35

General Education (7 courses)	24	2.01	(10 courses) General Education (7 courses)	1.9
Psychology (4 courses)	12	1.34	Psychology (4 courses)	1.52
Humanities (2 courses)	7	2.03	Humanities (2 courses)	2.07
Optional Courses/Minor Courses (4 courses)	20	1.84	Optional Courses/Minor Courses (4 courses)	1.54
Training (4 courses)	14	1.24	Training (4 courses)	1.16
Technology (2 courses)	8	1.21	Technology (2 courses)	1.43
Free Courses (4 courses)	8	2.54	Free Courses (4 courses)	2.17
Language of Teaching (2 courses)	7	1.6	Language of Teaching (2 courses)	1.67
Art (1 course)	2	2.68	Art (1 course)	2
Total	180			

Answers of the focus group related to the science and math major and minor courses are detailed in Tables 7 to 12.

Table 7. Majors in semester 1 of teaching of science/mathematics at the elementary level

I find the courses important for my future career as a teacher	No of Credits/ Total= 30 Credits	Science Students Mean=1.5	Math Students Mean=1.5
Development of Educational Thought	4	2.25	2.21
Documenting Research	2	1.94	1.63
Psychology of Development	4	1.25	1.47
Computer fundamentals and its Applications	4	1.12	1.6
Descriptive Statistics	4	1.44	1.26
Electricity and Magnetism/Calculus 1	4	1.31	1.36
States and Organization of Matter/ Geometry and Measurement1	4	1.2	1.26
Classification, Cytology and Histology/ Arithmetic	4	1.2	1.26

Table 8. Majors taught by science and Mathematics in Semester 2

I find the courses important for my future career as teacher	No of Credits/ Total= 30 Credits	Science Students Mean=1.5	Math Students Mean=1.5
Curricula	2	1.93	2.1
Psychology of Learning	4	1.31	1.63
Arts Workshop	2	2.68	2
History and Nature of Science/ Introduction Teaching Mathematics	4	1.68	1.31
Mechanics and Heat/Linear Algebra	4	1.18	1.38
Chemical Compounds and Reactions/ Geometry and Measurement 2	4	1.88	1.31
Animal and Plant Physiology/ Computer Programming 1	4	1.06	1.42
Human Rights	3	1.87	1.84
Language of Teaching	3	1.28	1.25

Table 9. Majors taught by science and mathematics in semester 3

Majors/I find the courses important for my future career as teacher	No of Credits/ Total= 30 Credits	Science Students Mean=1.5	Math Students Mean=1.5
Evaluation of Learning	4	1.87	1.84
Classroom Observation	2	1.45	1.15
Techniques of Expression	4	1.93	2.1
Energy and Waves/ Abstract Algebra	4	1.25	1.31
Animal and Plant Reproduction/ Computer Programming 2	4	1.12	1.31
Teaching Science 1 /Teaching Mathematics 1	4	1.36	1.1
Optional Course1 (Minor): Geometry and Measurement 1/ States and Organization of Matter	4	1.68	1.47
Optional Course 2 (Minor): Abstract Algebra/ Cytology and Histology	4	1.75	1.47

Table 10. Majors taught by science and mathematics in semester 4

Majors/I find the courses important for my future career as teacher	No of Credits/ Total= 30 Credits	Science Students Mean=1.5	Math Students Mean=1.5
Classroom Management	4	1.5	1.47
Practice Teaching 1	4	1.3	1.21
Technology in Teaching	4	1.31	1.26
Teaching Science 2/Teaching Mathematics 2	4	1.62	1.1
Environmental Education	2	1.5	1.84
Optional Course 3 (Minor): Geometry and Measurement 2/Mechanics and Heat	4	1.62	1.57
Optional Course 4 (Minor): Computer Programming 1/Animal and Plant Physiology	4	2.31	1.66
Optional Teaching Specialization Course 1 (Minor): Introduction to Math Teaching/History and Nature of Science	4	1.5	2.26

Table 11. Majors taught by science and mathematics in semester 5

Majors/I find the courses important for my future career as teacher	No of Credits/ Total= 30 Credits	Science Students Mean=1.5	Math Students Mean=1.5
Sociology of Education	4	2.25	1.75
Science Evaluation and Curriculum/ Mathematics Evaluation and Curriculum	4	1.37	1.64
Health Education	2	1.51	2
Earth and Space Science/Teaching Informatics	4	1.93	1.63
New Trends in Teaching Science/Calculus 2	2	1.74	1.7
Practice Teaching 2	4	1.18	1.1
Action Research 1	2	2.2	1.36
Optional Course 5 (Minor): Calculus 1/Electricity and Magnetism	4	2.33	1.42
Optional Teaching Specialization Course 2 (Minor): Teaching Mathematics 1/ Teaching Science 1	4	1.31	1.31

Table 12. Majors taught by science and mathematics in semester 6

Majors/I find the courses important for my future career as teacher	No of Credits/ Total= 30 Credits	Science Students Mean=1.5	Math Students Mean=1.5
The Lebanese Educational System	4	2.33	2.31
Citizenship Education	4	2.2	2.31
Educating Children with Special Needs	4	1.46	1.47
Action Research 2	2	1.56	1.47
Optional Course 6 (Minor): Practice Teaching for Mathematics/ Practice Teaching for Science	4	1.26	1.21
Optional Teaching Specialization Course 3	4	1.4	1.42

(Minor): Teaching Mathematics 2/ Teaching Science 2			
Free Courses	Total=8 Credits	Science Students Mean=1.5	Math Students Mean=1.5
Free Course 1	2	2.38	1.84
Free Course 2	2	2.5	2.26
Free Course 3	2	2.53	2.25
Free Course 4	2	2.78	2.36

## Results related to Research Question 2

### Teachers Suggestions

Some teachers submitted their suggestions for new courses and remarks on their taught courses directly to the head of department, while others submitted syllabi of their courses after they met with colleagues teaching the same courses. The main teachers' suggestions were:

- Some courses are taught in frontal teaching; others need to be updated in terms of content, teaching, students' prerequisites and students' specialization.
- To redistribute some current courses, such as, Ethics of Teacher Profession, should be present in the 1<sup>st</sup> semester and not in the 6<sup>th</sup> semester, as it is in the current situation. Science/Mathematics curriculum and evaluation should be placed in the 2<sup>nd</sup> semester and not in the 5<sup>th</sup> semester. In addition, it is only till the 3<sup>rd</sup> semester that students start to learn about didactics and to visit schools for training. Teachers and trainers stressed on assigning more credits for teaching practice.
- To have the possibility for students to major in science and foreign language, science and sport, math and sport, music education and science, science and art education.
- Teachers remarked that many courses are good but should be adapted to the student specialization and linked to his/her future career; for instance, fundamental statistics cannot have the same syllabus for science and early childhood education. The current situation limits the choices of students in choosing minors and elective courses. It turned out that major and minors are not in every student choice.
- Some students aspire to develop their career by widening his/her horizons, such as, opening a school or after-school students tutoring center. Thus the need for students to gain skills in management and accounting.
- To include courses such as, STEM courses, Quality management and science and industry.
- Due to the need of many students graduating from the faculty, who have the possibility to teach science and Mathematics for Grades 8, 9 and 10 in the private sectors, it would be beneficial to set a new bachelor degree in science and Math education for the middle school level. This possibility is congruent with the Decree 2225 (Date: June 11, 2009) related to the Lebanese University, which highlights the mission of the Faculty of Education, that has the major role in teacher preparation of elementary and intermediate levels.
- Finally, the LMD program is not applied properly at the Faculty of Education. In terms of the *master*, students graduating from the faculty cannot continue their graduate studies, because there is no M1(Professional Master) or M2 (Research Master) in science and Mathematics education for the elementary level. Students have to change to other disciplines or they have to continue in private universities or abroad. As for *doctorat*, only students coming from the Faculty of Sciences are allowed to continue their Master and Doctorate programs in science or Mathematics education for the secondary level.

### The Focus Group Suggestions

Students in their last semesters proposed many ideas. Some of these ideas are the followings:

- There are lots of courses per semester.
- The daily schedule is too long. Four lectures per day over 5 days, and the school visits timing for training is not adequate or enough.
- Some courses should be removed, like in general education and psychology courses; there is redundancy in some themes.
- To let the student choose the minor, it is currently imposed by the administration.

- Some courses like, Development of Educational Thought, Sociology of Education and The Lebanese Educational System, are taught with frontal teaching, and some content are rote memorized with no examples.
- To cancel some courses irrelevant to our specialization, especially the elective courses, that is actually compulsory ones.
- In the last semester, we learn only one course in teaching, and we do not learn any pure science or mathematics. We graduate and we've almost forget already many concepts!
- Because we are science and math teachers, we should have more courses related to science, such as, science and its applications in our daily life.
- To involve students in youth campaigns, related to health and the environment.
- To have the right to choose the elective or free courses and to be spread over the semesters and not focused in one semester (6<sup>th</sup> semester).
- The faculty should be equipped with computers, LCD projectors, lab materials and ACs.
- To start courses, such as, new trends in teaching science in the 1<sup>st</sup> semester, in order to be on the right research tracks. Science and Math Curriculum in the 1<sup>st</sup> semester, in this way, student can better prepare lessons for the school practice and classroom observation in the 2<sup>nd</sup> semester.
- To have practice teaching courses during one semester, or during the last year after theoretical courses.
- To learn about culture and leisure courses (cooking, sport...).

### **Results related to Research Question 3**

#### *Skills acquired by the focus group students*

Students in their last semester identified many social as well as pre-PCK skills. Some of the evoked skills are the followings:

- Skills such as, self-assessment, self-confidence, communication with classmates and teachers.
- Understanding basic science and math concepts and knowing and correcting students' misconceptions too.
- I learned how to transmit knowledge to children, taking into account their different cognitive abilities.
- I learned how to prepare lessons plans, use various teaching and assessment strategies.
- I learned how to manage classes and how to deal with children with ages 6-12.
- I have acquired skills in doing and displaying research.
- I learned to love teaching.

### **Conclusion**

The main purpose of this study was to collect teachers' and students' suggestions and remarks about the LMD program, as well as students' global assessment of courses and teaching practice related to the Science and Mathematics Department at the Faculty of Education, Lebanese University. In sum, students gained the essential pedagogical content knowledge, such as, lesson planning, students' misconceptions, and use of various teaching and assessment strategies.

Courses and school practice relevant to the Science and Mathematics Department are done smoothly with no major problems; learning atmospheres were far away from tension, but students emphasized on the little use of ICT in some courses (e.g., pure subject content courses). Moreover, students in their last semester did not find the content knowledge courses useful for their careers. These students rate below the average both pure Science and Mathematics courses and they emphasize more on the importance on teaching courses related to their minors specialization. The focus group did not find the training practicum helpful at schools; because, unlike the actual time and credits given to training, they assure they need more time to spend in real classroom settings. It was also striking the absence of skills such as, critical thinking skills and creative and lifelong learning skills. This is maybe due to the main use of frontal teaching in most courses, namely pure science and mathematics, as well as general education and psychology courses that relies on rote learning.

The LMD program was implemented at the Lebanese University since 2005 (Decree 14840). This program was applied at the faculty during the academic year 2008-2009. Ayoubi (2011, slide 21) presented 6 main obstacles in implementing the LMD program at the Faculty. Noting that, Professor Ayoubi is the former dean of the Faculty (2010-2015) and a member of the Science and Mathematics Department. These obstacles confirmed by the present research, are as follow: students are overwhelmed with the heavy load they have, many instructors

did not change the lectures' contents in the subjects they teach and their assessment practices, practicum courses and administration of the LMD program. Ayoubi (2011, slide 13) also recommended the followings:

- Updating the specialties and content of courses.
- Adopting new teaching and assessment methods: student-centered approaches to teaching and learning and continuous assessment.
- Teachers are required to review their teaching and assessment methods individually and collectively.

## Limitations and Recommendations

Based on data collected over 2 semesters, the Science and Mathematics Department presented a detailed report of the LMD situation and recommendations to the commission for the curriculum reform and program development.

Literature has shown that students tend to assess positively the course if they like their teacher. Data was collected using questionnaires distributed to students rather than online, during their semester end. This is because of the lack of sufficient computers at the faculty. Students should be guided and assisted to use the computers for online evaluation.

In addition, students have concerns mainly about grades. One of the recommendations was to change the formative assessment; it is a heavy load for students to have during one semester: 2 projects or tasks and one quiz per course. So for 8 courses per semester, the student is too busy doing 16 tasks and 8 quizzes! This situation makes students lack time to reflect on their acquired knowledge. Students in higher education should be more involved and to take part of any frequent assessment in the future at the Faculty level. They give thoughtful and valuable feedback. Also, future studies regarding students' assessment should also involve teacher's style (e.g., qualitative data collected from classroom observation). For future research too, details on pure subject knowledge courses in science and mathematics should be revealed in terms of teaching practice and content relevance. Future study will tackle the courses in semesters 2, 4 and 6, and main research ideas involve courses assessment according to students' outcomes.

Finally, from the very beginning, students were told about the aims and importance of course evaluations and how their evaluations are used. Students were serious in completing the questionnaires, because they knew that their feedback would make improvements to their courses.

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### Author Information

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#### **Suzanne El Takach**

Lebanese University, Faculty of Education  
Unesco Area,  
Beirut / Lebanon  
Contact E-mail: [suzanneeltakach@ul.edu.lb](mailto:suzanneeltakach@ul.edu.lb)

#### **Muhammad Rawas**

Lebanese University, Faculty of Education  
Unesco Area,  
Beirut / Lebanon

#### **Mohammad Dokmak**

Lebanese University, Faculty of Education  
Unesco Area,  
Beirut / Lebanon

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