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Current Situation of Professional Skills for Students of the Economic Sector through Teaching Mathematics - Case Study at Lac Hong University Viet Nam

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Abstract **– For the purpose of research to teach mathematics subjects to meet the output standards of the economic sector at Lac Hong University, we have researched and suggested professional skills needed for training the students in the economic sectors in the process of teaching mathematics modules in accordance with the CDIO output approach and from economic practice. However, the level of skill that students in the economics discipline are trained in and the degree to which they apply skills in learning and working is not clear. This paper, based on the results of the survey, provides an assessment of the current status of professional skills training for economics students at Lac Hong University. We hope that these results will serve as a practical basis for the development of teaching methods for mathematics in the direction of developing professional skills for students in order to teach the Mathematics modules to meet the learning outcomes of the students at Lac Hong University.**

Keywords **– Output Standards, Professional Skills, Economics, Mathematics, Current Situation.**

I. INTRODUCTION

Improving the quality, innovation in education and training are the most important criteria for a university in the era of science and technology today. The innovation is the inevitable trend of the times and according to the strategic development of education is reported at the 11th National Party Congress "Educational development is the first national education policy. Radical innovation, comprehensive education in Vietnam towards standardization, modernization, socialization, democratization and international integration" [6].

One of the important innovations at Lac Hong University has been implemented in the past is build the output standard with high requirements according to the approach CDIO (Conceive – Design – Implement – Operater) [5], [14], [15]. Output standard expresses the assertion about things a student needs to know, understand and possible to do when the program finish. However, a big question arises "Teach what? And how to teach? For subjects in the field of basic science and general knowledge to ensure the output standard?".

CDIO is the approach to training in the direction of output competencies in universities [4], [10]. This model provides a scientific basis and a set of quality standards that assure higher education institutions to address two key issues: what teach for students? (Teach what?) and how to students to gain knowledge? (How to teach?). So these questions are also the purpose we have set out above, these are issues that need to be addressed in higher education around the world in the context of knowledge boom, industrialization, internationalization, and other global issues.

Addressing these issues, the "CDIO" model mentions 12 standards that reflect the overall training process and quality management training. But more importantly, by approaching CDIO, the output standard is designed for training groups with 4 levels with enough detail to develop the curriculum, teaching design and assessment [4], [1]. CDIO theorists have developed a detailed list of knowledge and skills (outline, "CDIO") in a four-level structure that includes: Knowledge and reasoning; skills and personal and professional qualities; communication skills; forming ideas, design, implementation and operation in the corporate, social and environmental context. Level 2 of the CDIO outline reaffirms the role of subjects of basic knowledge for the output of the training program. It can be seen from the analysis that CDIO approach studies are aimed toward how to teach, so that when the graduate students achieve the output standard has been built. This study should be conducted for each specific subject in the curriculum.

From studies on CDIO output approach [4], studies on vocational skills requirements [2], [3] and the role of mathematics in the economic sector, We have proposed professional skills that should be taught to students in economics through the learning of the Mathematics module to meet the output standards [12]. Thus, it can be asserted that to teach the content of mathematics in the direction of ensuring occupation for students in the economic sector, besides equipping the knowledge of math, also need to necessary to organize the professional skills offered to students [7], [8], [9], [11].

Table I. Table of professional skills needs to practice through the study of mathematics

Serial	Skills content	Symbol
1	Skills to use the language of mathematics in economic activity	Skill 1
2	Teamwork skills	Skill 2
3	Creative thinking skills	Skill 3
4	Critical thinking skills	Skill 4
5	Self-learning skills	Skill 5
6	Modeling skills in situations economic practice	Skill 6
7	Skills in the research application in practice	Skill 7
8	Skills in collecting, analyzing and processing information	Skill 8
9	Problem solving and decision-making skills in economic analysis	Skill 9
10	Information technology skills	Skill 10

A question arises: What are the training and ability to meet the requirements of applying professional skills of students in study and practice? Is the question has no answer questions. Moreover, to propose measures to teach mathematics courses in order to effectively train

occupational skills for economic students, it is necessary to learn about the level of professional skills training of students. For the reasons mentioned above, we decided to do the research current situation of professional skills for students of the economic sector in Lac Hong University through teaching mathematics.

II. METHOD

A. Survey Overview

Purpose

Collecting and analyzing survey data on the current situation of professional skills training through studying Mathematics modules for economics students at Lac Hong, it provides a practical basis for the study of vocational skills training measures for economics students by teaching Mathematics subjects.

Content

We conducted a survey on the professional skills for Lac Hong University students through the study of Mathematics modules including: advanced mathematics and Probability and Statistics with the following basic contents:

- Assessment of alumni, trainers (teachers) on the factors affecting the employability of students in the economic sector;
- Assessments of alumni, teachers (teachers) on the role of mathematics in the economic sector
- Assessment of alumni, instructors on the level of professional skills training through the study of Mathematics modules
- Student, alumni and teacher assessments of the extent to which occupational skills are applied through the study of mathematics in the learning as well as in the professional activity in the economic sector.

Object

Subjects were:

- Students from the economic sector of Lac Hong University are 403 students;
- Alumni of the economic sector of Lac Hong University are 233;
- Lecturer in Economics at universities are 107 (of which the lecturer at Lac Hong University is 57, Lecturers at other universities are 50).

About the subject of the survey

To study the current situation of professional skills training through studying the mathematics modules we investigated on the subjects are:

- 403 students in other specialties: Business Administration, Foreign Trade, Accounting and Finance of Lac Hong University. Selected students are third-year students and fourth-year students (Students are practicing in businesses). Includes, third-year students accounted for 32% and fourth-year students accounted for 68%;
- 233 alumni of various disciplines and they are working in the field of economics, varied survey subjects include alumni who work in state-owned enterprises and foreign-invested enterprises;
- 107 lecturers from economic sectors such as: Bank finance, Accountant, Governance, Economics,... have teaching experience from 5 years to more than 10 years and instruct students to practice and research in applied science in economics at enterprises.

Methods and tools

+ The author directly teaches and attend some classes of Mathematics modules to observe student learning behavior, the teaching of the lecturer, direct interviews with faculty and students at those classes.

+ Observing and in of application of skills and math content in the study of basicterviewing students about the level and specialized subjects....

+ Interview with alumni about the content knowledge needs to equip students in the economic sector to ensure the application in practice and the level of skill training in the process of learning math as well as the ability to use those skills.

Survey Methods:

The author uses questionnaires compiled according to the assessment content as a tool to survey teachers, students and alumni.

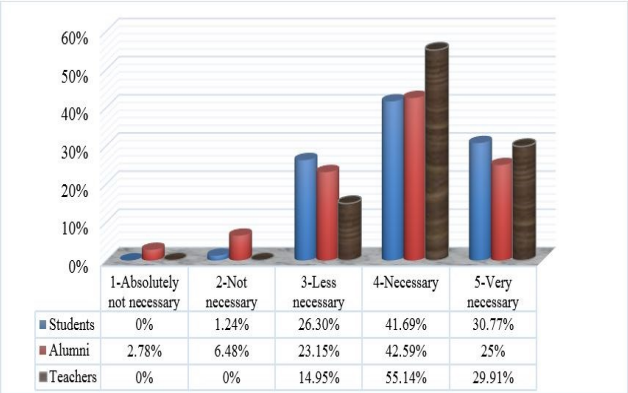
Method of Summing up the Experience:

The author organizes seminars, exchange ideas with alumni of the economic sector and lecturers (On the occasion of the meeting of alumni of economic sector 2nd, 12/08/2017) on the issues related to the contents to be surveyed, then sums up and adds to the results of the current situation.

III. RESULTS AND DISCUSSION

A. The Role of Mathematics in the Economic Sector

To find out about this, we raised the question: What is the role of math in the economic sector? For students, alumni and teachers, with answers: *1-Absolutely not necessary; 2- Not necessary; 3- Less necessary; 4- Necessary; Very necessary*. We have obtained the evaluation results (see chart 1).



	1-Absolutely not necessary	2-Not necessary	3-Less necessary	4-Necessary	5-Very necessary
Students	0%	1.24%	26.30%	41.69%	30.77%
Alumni	2.78%	6.48%	23.15%	42.59%	25%
Teachers	0%	0%	14.95%	55.14%	29.91%

Chart 1: Sum up the evaluation of the role of mathematics

The aggregate diagram shows that although there are slight differences in the perceptions of students, alumni, and teachers about the role of math in the economic sector; however, most of them are evaluated as necessary and very necessary. It also shows that mathematics plays a particularly important role in the economic sector of Lac Hong University.

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B. Evaluation of Alumni and Teachers of the Factors Causing Difficulties in Applying for Jobs of Students in Economics

To investigate this issue, we ask the question to teachers and alumni: The most difficult current economic sector students find a job is due to lack of:

☐ Knowledge ☐ Vocational skills ☐ Professional attitude ☐ Another idea

We get results (you can see table I and chart 2).

Table II: Assess the factors that make it difficult for students in the economic sector to find a job

Targets	Survey results	Ratio (%)
Knowledge	60	17,65
Knowledge, communication skills	4	1,17
Experience	14	4,12
Soft skills	2	0,59
Vocational skills	183	53,82
Foreign Language	2	0,59
Professional attitude	75	22,06
Total	340	100

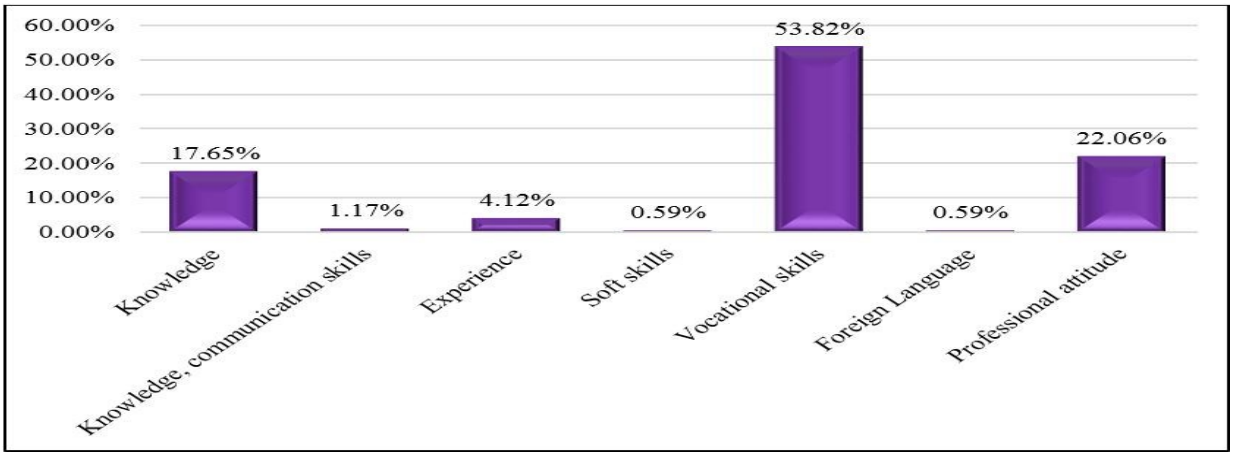

Chart 2. Synthesize students' difficulty assessments through the criteria

Aggregated assessment of teachers and alumni of the factors that make it difficult for students to find a job today is professional skills. This factor far exceeds the factors examined, this confirms that, strengthening of professional skills for students in economics is an urgent requirement in the study of Mathematics, In addition to equipping students with knowledge and enhancing attitudes during their studies at university campuses. Thus, students will have more opportunities to compete and find a job suitable for their job.

C. Evaluation of Students, Alumni and Teachers about Current Situation of Career Skills of Students through Learning Mathematics

Evaluation of students, alumni and teachers about the level of formation and development of professional skills of students through learning mathematics.

- To find out about this situation for teachers, we ask the question: **In table 1, Can you please tell us about the level of a student who was formed and developed through the study of the mathematics of Lac Hong University?, with options:** *1 - Very weak; 2 - Weak; 3 - Average; 4 - Good; 5 - Exerllent.* We get results (see table 2).

Table III. Teacher's assessment of the level of formation and skill development

Content	Level										Total	
	1-Very weak		2-Weak		3- Average		4-Good		5-Excellent			
	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Ratio (%)
Skill 1	9	8,41	11	10,28	61	57,01	26	24,30	0	9	107	100
Skill 2	0	0,00	14	13,08	62	57,94	31	28,97	0	0	107	100
Skill 3	0	0,00	13	12,15	53	49,53	26	24,30	15	0	107	100
Skill 4	0	0,00	12	11,21	62	57,94	20	18,69	13	0	107	100
Skill 5	0	0,00	10	9,35	35	32,71	59	55,14	3	0	107	100
Skill 6	5	4,67	12	11,21	64	59,81	24	22,43	2	5	107	100
Skill 7	2	1,87	41	38,32	51	47,66	10	9,35	3	2	107	100
Skill 8	0	0,00	15	14,02	70	65,42	20	18,69	2	0	107	100
Skill 9	6	5,61	24	22,43	58	54,21	17	15,89	2	6	107	100
Skill 10	9	8,41	32	29,91	55	51,40	11	10,28	0	9	107	100

- To find out the status for alumni, we have asked the question: **What skills have you formed and developed through studying Lac Hong University's mathematics modules?,** with choices like questions for teachers. We get results (you can see table 3).

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Table IV. Alumni' assessment of the level of formation and skill development

Content	Level										Total	
	1-Very weak		2-Weak		3- Average		4-Good		5-Excellent			
	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Ratio (%)
Skill 1	29	12,45	71	30,47	106	45,49	20	8.58	7	3,00	233	100
Skill 2	17	7,30	86	36,91	108	46,35	17	7.30	5	2,15	233	100
Skill 3	16	6,87	36	15,45	99	42,49	51	21.89	31	13,30	233	100
Skill 4	16	6,87	37	15,88	101	43,35	51	21.89	28	12,02	233	100
Skill 5	9	3,86	30	12,88	106	45,49	68	29.18	20	8,58	233	100
Skill 6	20	8,58	89	38,20	107	45,92	14	6.01	3	1,29	233	100
Skill 7	31	13,30	87	37,34	91	39,06	18	7.73	6	2,58	233	100
Skill 8	10	4,29	39	16,74	120	51,50	53	22.75	11	4,72	233	100
Skill 9	20	8,58	74	31,76	120	51,50	14	6.01	5	2,15	233	100
Skill 10	26	11,16	79	33,91	107	45,92	21	9.01	0	0,00	233	100

- To find out the status for students, we have asked the question: **What skills have you formed and developed through studying Lac Hong University's mathematics modules?, with choices like questions for teachers and alumni.** We get results (see table 4).

Table V: Student's assessment of the level of formation and skill development

Content	Level										Total	
	1-Very weak		2-Weak		3- Average		4-Good		5-Excellent			
	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results	Ratio (%)	Survey results
Skill 1	27	6,70	82	20,35	197	48,88	90	22,33	7	1,74	403	100
Skill 2	25	6,20	98	24,32	173	42,93	91	22,58	16	3,97	403	100
Skill 3	28	6,95	61	15,14	176	43,67	112	27,79	26	6,45	403	100
Skill 4	21	5,21	73	18,11	187	46,40	101	25,06	21	5,21	403	100
Skill 5	13	3,23	47	11,66	209	51,86	109	27,05	25	6,20	403	100
Skill 6	22	5,46	86	21,34	163	40,45	109	27,05	23	5,71	403	100
Skill 7	23	5,71	149	36,97	161	39,95	42	10,42	28	6,95	403	100
Skill 8	21	5,21	70	17,37	201	49,88	76	18,86	35	8,68	403	100
Skill 9	16	3,97	72	17,87	186	46,15	114	28,29	15	3,72	403	100
Skill 10	24	5,96	126	31,27	203	50,37	46	11,41	4	0,99	403	100

- Synthesize the level of the formation and development of skills through the study of Mathematics. We calculate the average of the skill levels of the professional skills assessed by teachers, alumni, and students. (See table 5 and chart 3).

Table VI: Average skills assessed by teachers, alumni, students

	Teachers	Alumni	Students
Skill 1	2,97	2,59	2,92
Skill 2	3,16	2,60	2,94
Skill 3	3,40	3,19	3,12
Skill 4	3,32	3,16	3,07
Skill 5	3,51	3,26	3,21
Skill 6	3,06	2,53	3,06
Skill 7	2,73	2,49	2,76
Skill 8	3,08	3,07	3,08
Skill 9	2,86	2,61	3,10
Skill 10	2,64	2,53	2,70

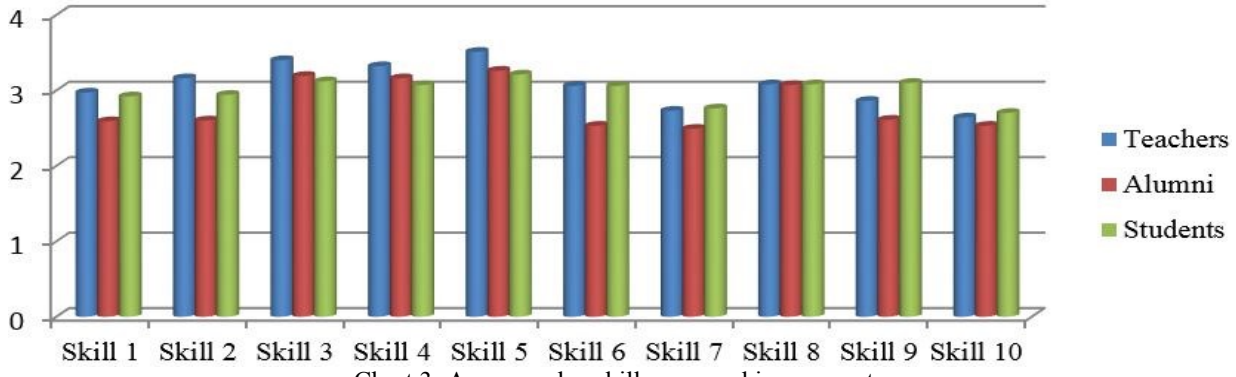


Chart 3: Average plus skills assessed in aggregate

Detailed assessment of the formation and development of professional skills through studying mathematics at Lac Hong University from the survey results, inquires and interviews, we make the following conclusions:

- Skills to use the Language of Mathematics in Economic Activity (KN1):

Teachers and students, evaluate in average with the average score is 2.97; 2, 92. Only alumni underestimate the

formation and development of this skill with an average score of just 2.59. Specifically, the average level of evaluation of teachers, students and alumni respectively: 81.31%; 72.95%; 57.08%. This result reflects the real situation by according to teacher Tran Dinh Anh, Advanced Mathematics Teacher "Previously Teachers taught pure mathematics is essential, the past two years began to harmonize the trend of innovation, bringing practical applications, practical situations into the unit, which helps students familiarize themselves with the use of Mathematical language solving practical problems ".

- Teamwork Skills:

The teacher assesses the student's ability to form and develop this skill at an above average level, the average percentage is: 86.92%, higher than the student's rating (with average ratings: 69.48%) and the lowest are alumni (with an average rating of 55.79%). According to alumni Tran Thi Kim Anh, class 08KT114, Finance and Accounting Department, she is currently working as an accountant at Bitis company, said: "When I was studying Mathematics at school, I just went to class to listen to the teacher lecturing, then doing homework, not having to do group presentation and group report, only this when learning specialized subjects". Other students, Nguyen Thu Phuong, class 14KT111, Finance and Accounting Department, said "During the previous year, when the advanced mathematics and the statistical probability were assigned work in group and presented to the class, but time is limited and mainly group exercises in the exercise section to apply knowledge learned". Teacher Nguyen Duc Anh, Statistical - Probability Teacher said "Mathematics modules are pretty much content, each subject is only 45 periods, In teaching we try to put the math problem and math requirements, to help them to learn and also to answer questions Teach Mathematics for economics to do?. For group activities, group work was delivered, assignments were given to groups, and assignments were presented to the class to get a point in the self-study point for students".

- Creative thinking Skills:

The teacher appreciates the level of formation and develops this skill for students in the study of mathematics, similar results come from alumni and students, the average rating is 87.85%; 77.68%; 77.92%.

- Critical thinking Skills:

The assessments of teachers, alumni and students have the level is quite similar to creative thinking skills.

- Self-learning Skills:

Rated at a relatively good level in both teachers, alumni and students, with an average rating of 90.65%; 83.26%; 85.11%. Student Nguyen Nhu Phong class 15QT111, Faculty of International Economics, said "They are given a lot of homework assignments by teachers and are mostly exercises that use learned knowledge. In order to solve the assignments, the students have to find the materials themselves to consult and study groups to solve together".

- Modeling Skills in Situations Economic Practice:

Teachers and students assess the level of formation and development of this skill through the study of mathematics at a relative level, Rating from average upwards are: 84.11% and 73.20%. Alumni assessing the formation and development of this skill is lower than that of teachers and students, specific percentages rated on average are just: 53.22%. Alumni Ho Thi My Duyen, class 12TC11, Finance And Accounting Department, said "Previous studies only pure math, when I go to work in a situation where I need to use Math to solve, I am quite surprised, however, once the solution is finished, I see the knowledge has been learned". It suggests that, in the past, when teaching Mathematics, Teachers did not focus on instructing students to model mathematical problems in order to familiarize them with the use of mathematical tools to solve practical problems..

- Skills in the Research Application in Practice:

Evaluation of teachers, students and alumni from above average, respectively: 59.81%; 57.32%; 49.36%, the level of evaluation good and excellent are modest: 12.15%; 17.37% and 10.30%, respectively, according to teachers, students and alumni, this shows that the learned knowledge has not been effectively applied to the practice.

- Skills in Collecting, analyzing and Processing Information:

The level is relatively good in both teachers, alumni and students with average rating: 85.98%; 78.97%; 77.42%. Fairly good rating, respectively: 20.56%; 27.47% and 27.54%. This shows that the student was initially instructed by the instructor to analyze and process the data while studying the Mathematics modules.

- Problem-solving Skills:

The teacher assesses the student's ability to form and develop this skill at a relative level, the above average rating is: 71.96%, good level is low: 17.76%. Alumni underestimate the level of formation and development of this skill with a mean percentage rating of 59.66%, good level only: 8, 15%. Particularly students the best evaluate the level of formation and development of this skill, with an average rating of 78.16%. And the good rating is: 32.01%. Similarly, modeling skills, or skills to use the language of mathematics, are important skills. The fact that this skill was initially focused on training in the teaching of Mathematics compared to the previous. Alumni Truong Thi Huong Giang, class 11TC118, currently working at ACB Bank, said "When I was a student, I was introduced to applied economics, but at a simpler level. After graduating, I am a project appraiser. There were many cases where I needed to use mathematics to solve problems. At first, I encountered many difficulties due to inexperience, even though the knowledge was learned at school."

- Information Technology Skills:

Average rated by teachers, alumni and students with an average rating of 61, 68%; 54.94%; 62.78%. Good rating is limited: 10,28%; 9,01%; 12,41%. Alumni Nguyen Van Thuy, class 10QT101 said "At school mathematics has not been instructed to use software to solve math problems", student Nguyen Minh Chau, class 14NT111 Faculty of International Economics, said "Teachers introduced the Math software and statistics but not yet used". Master Diep Cam Thu, Advanced Mathematics teacher, said "The program does not require, so almost only use the handheld computer, not instructed students use the software, however, it is necessary to guide students in economics using math software. In many cases, in the job of

economists just find the result of a math problem as quickly as possible". The fact that this skill has not been focused on training in the teaching of Mathematics for students.

Thus, from the analysis of the survey data and the interviews, we come to the following important conclusions:

- The level of formation and development of students' current skills through studying the Mathematics module at Lac Hong university mainly average, good and excellent are limited. Skills 3 (creative thinking), 4 (critical thinking), 5 (self-study) and 8 (data collection and processing) are formed and developed better than the rest.
- Initially, teachers paid attention to the practical situations of economics in teaching Mathematics to students, but not much and generally did not meet the requirements of the profession..
- *Some Skills are Regularly Practiced Such as:*

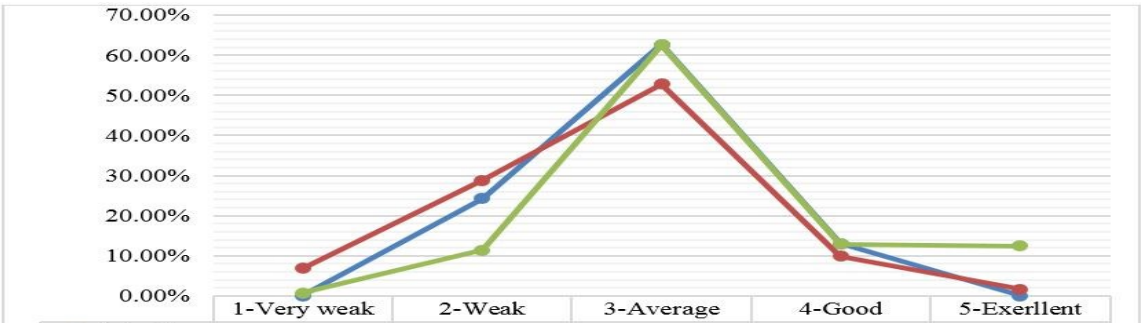
Data analysis, self-study. Some skills have been trained, but not as much as: Teamwork, problem solving, modeling and some skills are just mentioned such as information technology application, use of knowledge in practice.

Through the survey, we recognize that some reasons leading to the practice of professional skills for students in the economic sector are limited as above:

- The program is quite heavy in theory, not oriented much application.
- Teachers teach their own way, not the demands of economic practice, which means that they have not taught mathematics in the direction of meeting the output standards of the study.
- There is no direction to develop professional skills for students in the teaching process in a purposeful and specific way. To improve the professional practice of students, we need to do the following:
- Developing teaching methods develop specific skills for students in the study of Mathematics.
- Enhance the knowledge and skills of mathematics in the field of occupational economics, which will help students to apply the subjects to their careers in the future.
- Developing a large work assignment system: Accounting, Finance, Management, etc. to help students in each field have many opportunities to familiarize themselves with the application of mathematics to solve their professional practice..
- Curriculum development in the direction of training professional skills for students in the economic sector for the Mathematics module.

Assessment of students, alumni and teachers on the level of application professional skills of students in study and practice

To find out about this issue, we asked questions to the teacher: According to the teacher, how much of these skills are used by students in the study of economics subjects?; For alumni: How are the above skills used in professional practice?; And students: How are the above skills used in the study of economics subjects? **With options:** *1-Very weak; 2-Weak; 3-Average; 4-Good; 5- Exerllent.* We get results (see chart 4).



	1-Very weak	2-Weak	3-Average	4-Good	5-Exerllent
Teachers	0.00%	24.30%	62.62%	13.08%	0.00%
Alumini	6.87%	28.76%	52.79%	9.87%	1.72%
Students	0.74%	11.41%	62.53%	12.90%	12.41%

Chart 4. Synthesis assesses the level of skill application

The above results indicate that the level of application of professional skills of students in the study specialized subjects and sectoral basis, according to the assessment of students and teachers is quite similar, the highest is the average level of application, 62.53% and 62.62%, respectively. Students rated their ability to use their professional skills better than teachers rated at the level of application good use is 25.31% compared to 13.08%. About the level of application of professional skills in economic practice of the alumni, the overall level is quite limited, of which the highest average was 52.79%; the level of appreciation, good only 11.59%, whereas the sum of the degree very weak, weak and average up to: 88.41%. This is also the basis for confirming the fact that students at the time of graduation have not utilized a wide range of occupational skills through the study of mathematics in their own economic practice. Alumni Doan Quang Duy, class 12TC113, Finance and Accounting Department, currently working at Changshin company, said "At work, sometimes encountered situations need to use Math, Initially I solved quite difficult because I do not know how to switch to using the Math tools, But after listening to the guidance from my co-workers then I get used to it and realized that the knowledge I had was learning". Master Phan Thanh Tam, teacher of statistical theory, said "When solving problems using statistical functions, students need to be guided, in previous subjects, they have not been instructed to use these statistical functions.". Student Qui

Van Tran, class 14KT111, Finance and Accounting Department said "Most of our subjects are related to math, But the level is quite simple and I can use the knowledge learned to study the subjects: Calculate interest rates, calculate the percentage increase, decrease of profits,...". Mr. Nguyen Xuan Vinh, senior specialist in charge of recruiting Sacombank said that "Mathematics is especially important to the economic sector, through working in the bank, I see the ability to manipulate the math of students is not flexible, Specifically, when faced with the situation arises, they are still confused and almost do not know how to switch to using problem solving math."

This analysis shows that students need to improve their professional skills while learning math, As such, students will master their professional skills and application will be improved in their studies as well as in later professional practice.

IV. Conclusion

The results of the survey on the current situation of professional skills training for economics students by teaching Mathematics modules to us the following conclusions:

First, the results confirm the important role of mathematics modules, namely: Advanced Mathematics and Statistics - Probability for the economic sector.

Second, the results shows that among the factors that make it difficult for economics students to find a job, the most important factor is the lack of professional skills.

Third, the level of formation and development of professional skills in learning the mathematics modules at Lac Hong University is currently at an average level. It will be necessary to further enhance the training of professional skills for students in the future through the Mathematics module in particular and the training process in general.

Fourth, the ability to apply skills related to Math in the study as well as in the practice of students is not good. This is understandable because the skills are not much training during the study of mathematics at Lac Hong University today.

Fifth, there are many reasons for this, and one solution is to develop measures to develop specific career skills for students through teaching the content of mathematics at Lac Hong University.

As a result, the survey shows that the teaching of vocational training to students in the economic sector is very necessary, it is consistent with the teaching practice at Lac Hong University. But what measures should we take to teach professional skills is the question we will answer in the next research.

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