

An Overview to the Map Cadastral Departments at Vocational Schools: Last 5 Years

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ABSTRACT

Changing and developing world, education has to change systems and environments. Updating education systems according to the necessities of the age, positively affects the teaching – learning point of view, knowledge and professional competence by providing the stability of all parts of the system. Vocational Schools update their syllabus every five year. This update requires lecturers to improve their self, schools to renew technically and managerially, departments to have technological and scientific software and hardware according to their needs. With these updates the graduates will have the standard professional competence in line with the requirements of the market.

The aim of Map Cadastral Departments at Vocational Schools which give two-year education is to train individuals with land measuring and mapping skills according to the needs of public and private sector. Today people who examine the content and future of mapping services mention dynamic mapping. Dynamic mapping is a kind of mapping which stays in its own service area by benefiting from scientific and technological developments and produces the service and knowledge that must stay in its service area. When we look from this point of view, the institutions which train individuals with mapping and cadastral skills must achieve the aim of training professional people, contribute to the market and giving them the necessary education by meeting the demands of this age and technology.

It is seen that in order to help the students who have mapping education; the schools must know what kind of mapping education programs they need, which education methods to use, the features that learners and teachers must have in order to create a more productive educational environment, the features that educational environment and application area must have.

In this study it is aimed to highlight the problems that Vocational Schools encountered during the last 5 years, the specifications that students must have until they graduate. The Hitit University Vocational School has been taken as an example in this study. This study aims to help taking precaution by highlighting the next 5 years.

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1. INTRODUCTION

The conception of a sustainable environment has been one of the most important agenda topics of countries. While developed countries take stringent precautions, developing countries are not aware of it. The conception of a sustainable environment can be realized by knowing, conducting and protecting it. In this context the science of cadastral mapping has a particular importance. While quality and sustainable is important for Sector of Mapping and profession, also common law, vocational education, technical standards, information standards, information exchange standards and organizational structure are important. Important changes and restorations seem inevitable in next five years of Turkish sector of mapping (Url_5).

Besides having a dense manpower, the cadastral mapping has become a sector where technology is also more important. In other words it is a sector where manpower is very important and supported with technology. Common use of technology at cadastral mapping causes to the increase of qualified personnel's importance (Köktürk, 2012).

The developing technologies in parallel with rapidly progressive technology of information and communication add dimension to mapping, and a fast transition from classical mapping to digital image processing, from digital image processing to geographical information systems has started.

These technologies found wide application areas, technology transfers have been made, many application projects have been carried out by state institutions and organizations, municipalities and universities. When we look at new applications of technology in our country, today it is not possible to say that sufficient research and evaluation are done at the beginning of choosing project's content, determining necessities, planning of service, training of the personnel and choosing technology. Generally it is seen that first the technology is transferred and after that other subjects are discussed.

2. MAP and CADASTRAL PROGRAM

2.1. Guideline

Those are the programs which are located at Universities' Vocational Schools' Technical Programs and give two-year vocational education. Students who graduate from this program start their career with technician title (Url_1).

Students who graduate from Vocational Schools' Map and Cadastral Programs are the people, who develop infrastructures of projects like cadastral map, dam, road, power line,

arrangements of urban and rural areas and function between geodesy – photogrammetry engineer and map and cadastral technician during the production of zoned maps. These people take on the tasks below;

- Analyses the area whose map is going to be prepared,
- Draws the map and sketch of area with different equipment,
- Makes calculations according to land measurements,
- Makes corrections and colorings on maps,
- Carries out the maintenance and tuning of equipment that will be used at land measurements,
- Acts as surveyor at courts when there are no geodesy and survey engineer.

2.2. Professional Tools

- Land measurement tools (Range pole, leveling instrument, alto meter, total station, GPS....)
- Drawing tools (Manual or computer aided)
- Computer and vocational software

2.3. Required Qualifications of Profession

The people who want to be map and cadastral technician;

- Must have general ability,
- Must be able to see relations of form – spatial,
- Must be able to make arithmetical and geometrical calculations,
- Must have eye-hand coordination and drawing ability,
- Must like working outdoors and at field,
- Open to cooperation,
- Must be fit and strong.

2.4. Work Environment and Conditions

Map and cadastral technicians work at office, outdoors, standing, walking, climbing, and crouching at every climatic condition. They cooperate with topographers, map, geological, geodesy, geophysics – photogrammetry, civil, environmental and petroleum engineers. Their works are primarily related with data. Their job requires frequent travels.

2.5. Field of Study and Employment Opportunities

Map and cadastral technicians can work at state institutions, municipals and agency – institutions related with them and map, mining and construction companies of private sector.

3. EDUCATION PROBLEMS

One of the problems of vocational education is lacking in necessary departments in direct proportion to employment and another problem is the inability at training qualified labor force. Wrong plans – programs and lacking in infrastructure lie behind these problems. In this respect many new universities have been set up and preparations for the new ones are being carried out. Department of map and cadastral at the vocational schools of these universities are opened. But there aren't adequate environment and classroom, lecturer, laboratory,

technical equipment and social opportunity.

The problems of education at the sector must be dealt at a wide range starting from secondary education to in-service training and certification programs.

At the departments, a new point of view for the following subjects is needed

- Education content and syllabus,
- Quota and settlement conditions,
- Instructional staff and their qualifications,
- Financial infrastructure of education,
- Access to information, usage and communication,
- Relations of departments with mapping sector

3.1. Education Content and Syllabus

According to the project called MEB-YÖK “Meslek Yüksekokulları Program Geliştirme Projesi - College Curriculum Development Project” which started in 2002 and continues today, courses which are taught at map and cadastral programs are listed below.

Table 1: MEB-YÖK Curriculum

First Semester						Second Semester					
Course Name	C/E	Te	Pr	Kr	ECTS	Course Name	C/E	Te	Pr	Kr	ECTS
Mathematics – I	C	3	1	4	4	Mathematics – II	C	3	1	4	4
Basic Maps	C	2	0	2	2	Survey – II	C	3	2	4	5
Survey - I	C	3	2	4	5	Drawing Maps – II	C	2	1	3	3
Drawing Maps – I	C	2	1	3	3	Trigonometry – II	C	2	0	2	2
Instruments Knowledge	C	2	1	3	3	Survey Applications	C	2	1	3	3
Computer – I	C	1	1	2	2	Computer – II	C	1	1	2	2
Trigonometry – I	C	2	0	2	3	Geodetic Computation	C	3	0	3	3
Foreign Language – I	C	4	0	4	4	Foreign Language – II	C	4	0	4	4
Turkish Language – I	C	2	0	2	2	Turkish Language – II	C	2	0	2	2
Atatürk's Principles and History of Revolutions – I	C	2	0	2	2	Atatürk's Principles and History of Revolutions - II	C	2	0	2	2
						Industrial Based Training					
		23	6	28	30			24	6	29	30
Third Semester						Fourth Semester					
Course Name	C/E	Te	Pr	Kr	ECTS	Course Name	C/E	Te	Pr	Kr	ECTS
Survey – III	C	3	2	4	5	Survey – IV	C	3	1	4	4
Application of Public Improvement Plans-I	C	3	1	4	5	Application of Public Improvement Plans-II	C	3	1	4	4
Cadastral Surveying – I	C	3	0	3	3	Cadastral Surveying – II	C	4	0	4	4
Road Planning	C	2	1	3	3	Quality Assurance and Standards	C	2	0	2	2
Application of Land Register System	C	2	0	2	2	Photogrammetry	C	3	0	3	3
Law – I	C	2	0	2	2	Law – II	C	2	0	2	2
Application	C	2	1	3	2	Field Practice	C	2	2	3	3
Modern Measurement Techniques - I	E	3	0	3	4	Modern Measurement Techniques – II	E	3	0	3	4
Position Identification Systems – I	E	3	0	3	4	Position Identification Systems – I	E	3	0	3	4
Geographical Information Systems and Remote Sensing – I	E	3	0	3	4	Geographical Information Systems and Remote Sensing – II	E	3	0	3	4
Professional Software – I	E	3	0	3	4	Professional Software – II	E	3	0	3	4

					Industrial Based Training					
		23	5	27	30		25	4	28	30

Made under IKMEP workshops in 2009, Education Commission of Mapping and Cadastre study lasting approximately six month and during this time as a result of the mapping and surveying curriculum consisted of four workshops.

Within the framework of Development of Human Resources by Vocational Education Project (IKMEP) which started in 2011 and supported by European Union the education content and syllabus of map and cadastral programs has been changed.

Table 2: İKMEP Curriculum

First Semester						Second Semester					
Course Name	P/C/E	Te	Pr	Kr	ECTS	Course Name	P/C/E	Te	Pr	Kr	ECTS
Professional Mathematics	M	4	0	4	5	Professional Calculations	C	4	0	4	4
Professional Trigonometry	M	3	0	3	5	Photogrammetry	M	3	0	3	4
Land Surveying-I	M	4	2	6	7	Land Surveying-II	M	4	2	6	8
Basic Law	M	3	0	3	3	Real Estate Law	M	3	0	3	4
Atatürk's Principles and History of Revolutions – I	C	2	0	2	2	Atatürk's Principles and History of Revolutions – II	C	2	0	2	2
Turkish Language – I	C	2	0	2	2	Turkish Language – I	C	2	0	2	2
Foreign Language – I	C	2	0	2	2	Foreign Language – II	C	2	0	2	2
Total		20	2	22	26	Total		20	2	22	26
Professional Ethic	E	2	0	2	2	Professional Ethic	E	2	0	2	2
Communication	E	2	0	2	2	Communication	E	2	0	2	2
Information Communication Tech	E	2	1	3	4	Information Communication Tech	E	2	1	3	4
Environmental Protection	E	2	0	2	2	Environmental Protection	E	2	0	2	2
Business Administration -I	E	3	0	3	4	Business Administration -I	E	3	0	3	4
Business Administration -II	E	3	0	3	4	Business Administration -II	E	3	0	3	4
First Aid	E	6	0	6	6	First Aid	E	6	0	6	6
Research Method and Techniques	E	2	0	2	3	Research Method and Techniques	E	2	0	2	3
Quality Assurance and Standards	E	3	0	3	3	Quality Assurance and Standards	E	3	0	3	3
Quality Management System	E	2	0	2	2	Quality Management System	E	2	0	2	2
Professional Foreign Language-I	E	2	0	2	2	Professional Foreign Language-I	E	2	0	2	2
Professional Foreign Language-II	E	2	0	2	2	Professional Foreign Language-II	E	2	0	2	2
Total		22	3	25	30	Total		23	2	25	29

Third Semester						Fourth Semester					
Course Name	P/C/E	Te	Pr	Kr	ECTS	Course Name	P/C/E	Te	Pr	Kr	ECTS
Cadastral Survey	M	3	0	3	3	Cadastral Survey	3	0	3		4
Map Drawing-II	M	2	1	3	4	Map Drawing-I	2	1	3		4
Land Surveying-III	M	4	2	6	8	Land Surveying-IV	3	1	4		6
Land Management	M	4	2	6	6	Application	3	1	4		6
Total		13	5	18	21	Map Making	3	1	4		4
Professional Ethic	S	2	0	2	2	Total	14	4	18		24
Mapping Activities	S	2	0	2	2	Professional Ethic	2	0	2		2
Communication	S	2	0	2	2	Communication	2	0	2		2
Information Communication Tech	S	2	1	3	4	Geographic Information System	2	0	2		2
Environmental Protection	S	2	0	2	2	Information Communication Tech	2	1	3		4
Business Administration -I	S	3	0	3	4	Environmental Protection	2	0	2		2

Business Administration -II	S	3	0	3	4	Business Administration -I	3	0	3	4
First Aid	S	6	0	6	6	Business Administration -II	3	0	3	4
Research Method and Techniques	S	2	0	2	3	First Aid	6	0	6	6
Quality Assurance and Standards	E	3	0	3	3	Research Method and Techniques	2	0	2	3
Quality Management System	S	2	0	2	2	Quality Assurance and Standards	E	3	0	3
Professional Foreign Language-I	S	2	0	2	2	Quality Management System	2	0	2	2
Professional Foreign Language-II	S	2	0	2	2	Professional Foreign Language-I	2	0	2	2
						Professional Foreign Language-II	2	0	2	2
						Industrial Based Training (6 weeks)	0	40		10
Total		20	5	25	30	Total	21	4	25	42

Although the program has its own logic, manner of application and form, its drop due to prescription led to new searching. Also it was seen that nations must give more importance to vocational education. Therefore the syllabus which was brought by İKMEP is supposed to be more effective. The comparison of two programs at figure-1 (MEBYÖK – İKMEP) with some parameters has been made.

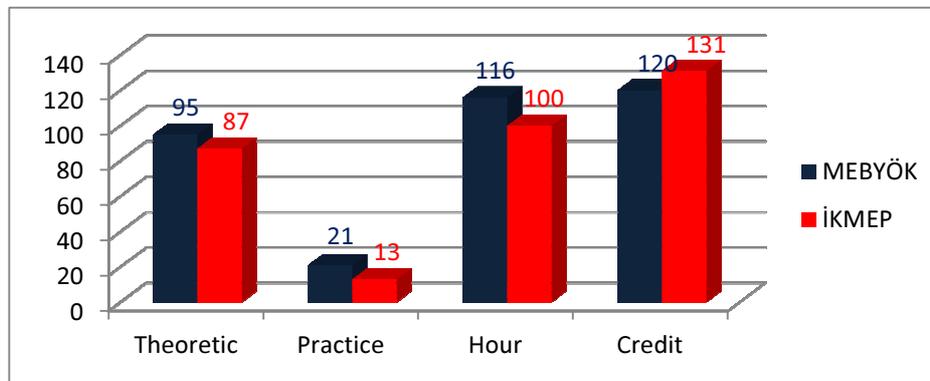


Figure-1: Comparison of Two Curriculums (MEBYÖK – İKMEP)

3.2. Quota and Placement Conditions

The student quota has increased substantially due to new universities and departments opened in last five years. But, Turkish Higher Education Council's quota increase at existing departments led to some problems at universities which don't have sufficient infrastructure. While total quota of Map and Cadastral Departments in all Turkish universities was 2670 in 2006, the occupancy rate was 2641. In 2011 total quota was raised to 3430. While 3384 of this quota was full, occupancy rate was %99 in between 2006-2011. This is a high ratio compared with other departments at Vocational Schools. Detailed numbers are listed in table 3 and table 4. (Url_2)

Table 3: Total quota and occupancy for the year of 2006

State Universities				Private Universities					
Normal Education		Evening Education		%100 Scholarship		%50 Scholarship		%25 Scholarship	
Quota	Occupancy	Quota	Occupancy	Quota	Occupancy	Quota	Occupancy	Quota	Occupancy

1850	1835	820	806	0		0		0	
%99.1		%98							

Table 4: Total quota and occupancy for the year of 2011

State Universities				Private Universities					
Normal Education		Evening Education		%100 Scholarship		%50 Scholarship		%25 Scholarship	
Quota	Occupancy	Quota	Occupancy	Quota	Occupancy	Quota	Occupancy	Quota	Occupancy
2025	2007	1375	1370	5	5	10	2	15	0
%99.1		%99.6		%100		%20		%0	

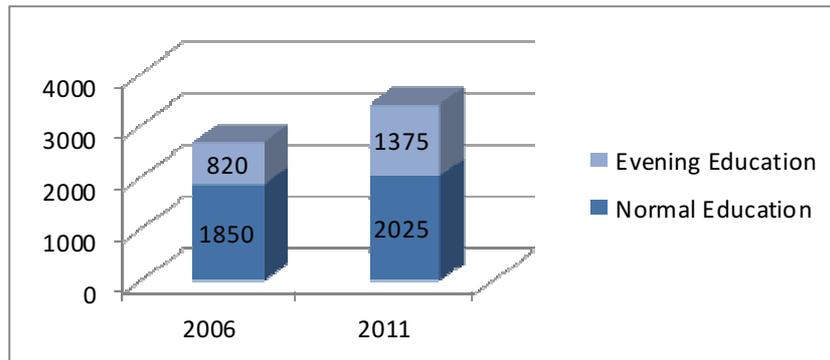


Figure-2: Quota numbers for the years of 2006-2011 in Mapping and Cadastre Department

As seen at figure-2 there is a %28 quote raise between the years of 2006-2011. This increase was done mainly at evening education classes. All Vocational School in Turkey quota and admitted the student rates between 2006-2011 years are given figure 3. (Url_3)

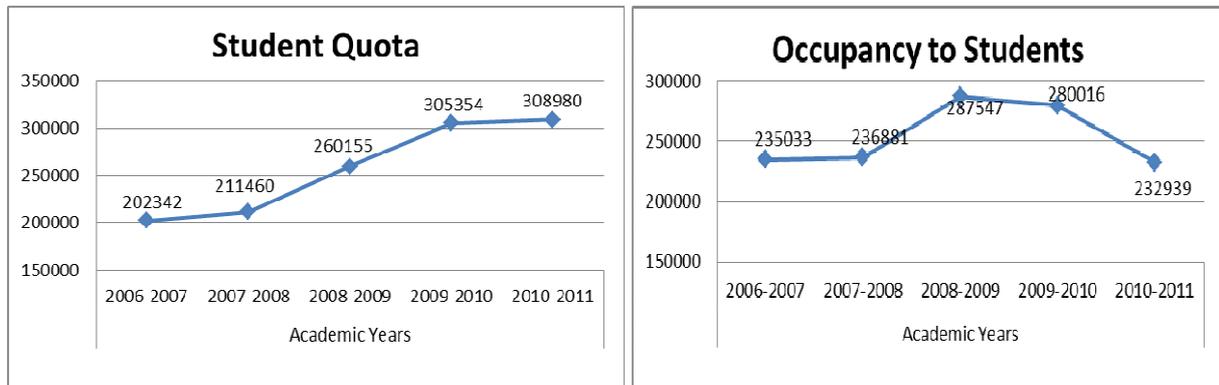


Figure-3: Quota numbers for the years of 2006-2011 in all Vocational School

3.3. Staff and Their Qualifications

Figure-4 shows the changes in the number of students per academic staff in higher education between 1984–2011. Between 1984–2011 the number of students per academic staff is at the

level of 13–19 students. While the number of students per academic staff in 1984 is 13,85, it is 18,86 in 2011. In Turkey, the number of students per academic staff is higher than the average of 2008 OECD (15,8) countries. (OECD, 2010). As the main reason is that the increase in the number of students in higher education is more rapid than the increase in the number of academic staff, the number of students per academic staff has not developed during 1984–2011. In other words, while the number of students increases 650 % approximately, the number of academic staff increases 450 % approximately between 1984-2011. On the other hand, during 1984-2011 the number of students per academic staff is at the level of 41-49. The number of students per academic staff is 41,26 and 45,98 (Günay and Günay, 2011).

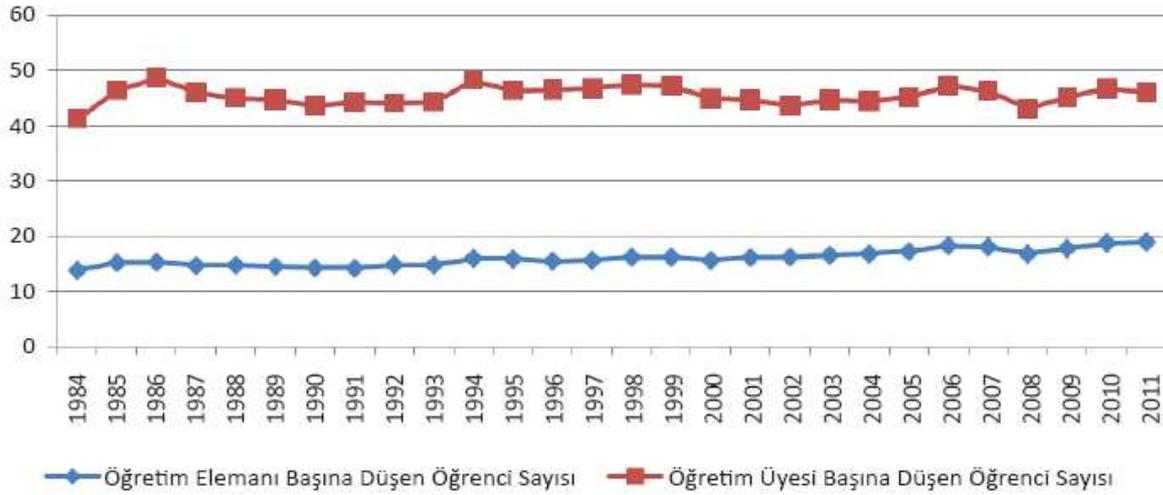


Figure-4: The number of students per academic staff in Turkey, 1984-2011(Günay and Günay, 2011).

The Map Cadastral Programs generally consist of the engineers who graduated from the departments of Geodesy and Photogrammetry Engineering. Although the staff have a fully equipped in terms of Professional knowledge and skills, they have lack of pedagogical knowledge .

Çorum Vocational School has 80 students in total (40 students at Normal Education + 40 Students at Evening Education). The staff of this department consist of 3 Map Engineers (m.sc). These academic staff have about 30 hours of courses a week.

3.4. Financial Infrastructure of Education

The students are expected to do some practices in the laboratory and fields in order to strengthen their theoretic knowledge with practices. The computer laboratory which is necessary for these practices must have one computer, licensed programs, delineascopes, writers, plotters and internet connections per student. The students need a drawing room containing drawing tables in order to use the drawing courses. Besides, theodolite and its set, total station and its set, levelling instruments, gps and length measuring instruments come to mind first between the professional tools and equipment which are necessary for land applications.

Many of Vocational Schools have computer laboratories which are used commonly, inadequate in terms of numbers and limited time for students. Many of these computers are outdated in terms of technical features. Also, these computers have limited use of licensed programs. Providing consumables and keeping printer, plotter and scanner as peripheral accessories in the laboratories create the problems.

Many of these laboratories have lack of personnel who provide technical support for maintenance and repair. The instructors at Vocational School meet the needs and spend additional time and effort. Çorum Vocational School has 21 computers with 24 hours internet connection and latest technology, 1 laser printer, 1 A0 ploter, A3-A4 Scanner and usage licenses of professional softwares including operating system for only the Department of Map. The school has 10 theodolites, 3 total stations, 5 levelling instruments, one handheld GPS and laser measuring device for measuring distance.

3.5. The Relations of Academic Units With Mapping Sector

3.5.1. The Position of Private Sector

Mapping private sector is such a private office sector as it has not been identified and organized structurally. This private sector should be redefined and reorganized because the organization of the private sector (the method of producing work), its staff, its instruments, its standard producing work are necessary for increasing production and capital.

3.5.2. The Opportunity of Practical Training

Students are expected to do practical training to transfer their theoretic knowledge to the real environment and gain experience throughout their lives. Therefore, 6 weeks of practical training in total is planned in the training programs. The students are expected to do practical training related with their departments in government institutions or private sectors. However, it is observed that some of students do not do practical training as a full time or do not make professional activities in their practical training.

3.6. Access to the Data, Use and Communication

Production of map is carried out by two methods as conventionally and numerically. During the next five years, it is expected that the works of map production will be made in fully digital environment. The die plates which are produced by classical methods can be used by buying from the producer organizations after printing or duplicating. Paying the appropriate price per the die plate needs to arise for supplying the die plates. In digital production, the final product is supplied in an single copy and digital environment and the owner can use the product by duplicating. Over the same geographical region, the necessary legal amendments for different projects should be made about supplying required numerical data from the producer organizations. As it's the time of the transition from the classical production to digital production, the necessary legal amendments should be made about paying the copyrights for the products that constitute the base for digitized data.

Necessary legal and technical infrastructure should be constituted about supplying to the needers in return for copyrights by the producer organizations over data servers of digital data

(for instance, internet) as on-line and/or offline.

3.7. Professional Competences

The government bill about Professional Competency Board was referred to the Grand National Assembly of Turkey in 2006 and it was passed unanimously after being discussed at commissions as the law of Professional Competency Board with the number of 5544 on 21 September, 2006. Nevertheless, job description, its standards and its competences about Map Cadastral are not still constituted formally (Url_4)

Form and content of Professional Standards must be appropriate to 'Professional Standard Format' which is approved by the Board of Directors and prepared by examining the international examples and consulting to the committee. Professional Standard Format is prepared by taking into account the data and evaluation obtained from Professional Competency Board's applications and the changes in international applications and updated in order.

4. POSITIVE DEVELOPMENTS

Development of new instruments and their uses in applications related to the profession will help you save both time and decrease the workload with today's developments in science and technology. In addition, it will decrease the error rates which are seen in precise measurements.

In recent years there are some positive developments about professional training policies and higher education especially with the European Union Compliance Policies. Some of these developments are the program development processes, training of certifications, innovation transfers, student and staff mobilities via Lifelong Learning Programs.

Successful studies are carried out about the academic programs, academic staff's knowledge and skills and developments of social, physical opportunities with the quality management policies adopted by universities. Also, the studies about descriptions of professions which meet the today's needs and the determination of standards are carried out within the framework of European and National Professional Competence.

The importance of this profession will be noticed with interdisciplinary works that are carried out with the fields of Agriculture, Industry, Tourism, Archaeology, Advertising & Marketing.

Applications of map which are concerned with daily life and worked on mobile devices make easy for social life and this will increase the interest of profession.

The efforts of countries about constituting National Geographical Information Systems and City Information System of Local Authorities start to increase the importance of profession and rates of employment.

5. CONCLUSIONS AND SUGGESTIONS

Map Associate Degree Programs are struggling with basic problems such as deficiencies

in physical and technological capacity, competences and numbers of academic and administrative staff, inability about meeting the necessities of age and innovations of the profession and finally, lack of communication of the graduate students with the private sector.

Although the importance of vocational education in Turkey has increased recently, it is necessary for the institutions to reorganize and keep up with developments. All universities must adapt their physical and academic infrastructure to today's necessities and give a more efficient education to their students. In order to do that, universities must expand their education environments in direct proportion to student number, take precautions for increasing their administrative and academic staff's self-improvement. In a study of European Union Countries, trend and predictions is shown figure-5 in vocational education.

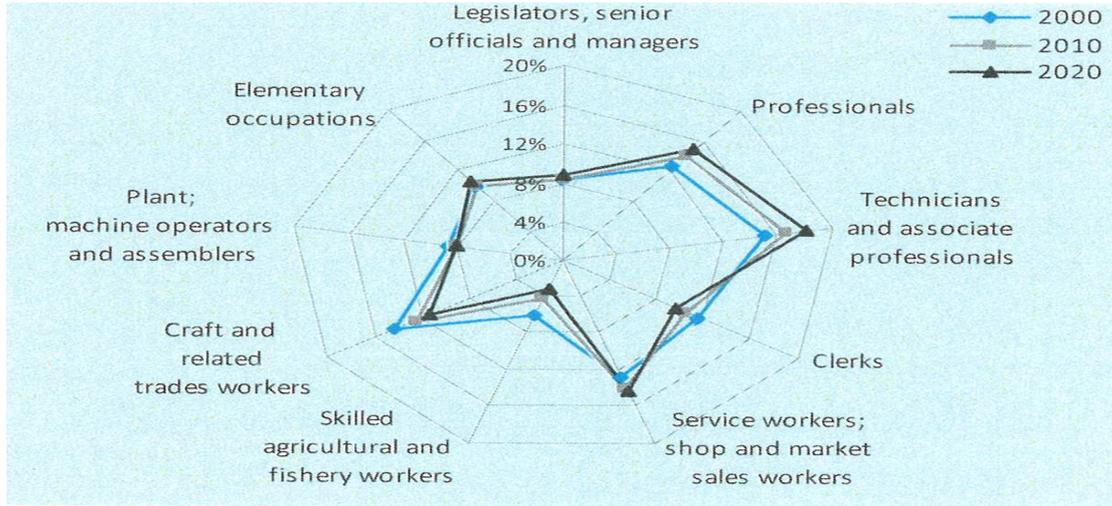


Figure-5: Changes in vocational education. (Günay D, Günay A.)

The high school students who will choose two – year degree programs must be more competent and their awareness must be raised about choosing a profession.

Required planning and partnerships must be done for students who graduate from Map and Cadastral programs in order to employ them at state and private institutions. With the help of this planning, there will be sufficient quota at schools and students will be accepted to this program.

In order to train students at world standards, professional competency must be brought to students by developing syllabus and curriculums.

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BIOGRAPHICAL NOTES

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