A Strategy for Increasing the Employment Rate of Graduates Using a Compact Module

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Abstract The aim is to increase the higher education employment rate in the first six months after graduation at Istanbul Technical University. The paper involves different systems and techniques used, such as; ITU Career and Skill Management System (KAYS), which is an internship- and job-seeking platform for Istanbul Technical University students, annual Career Summit performance analysis, workshops, interview simulations, company network, and mentoring modules. Initially, the process of determining the contents of the Career and Skill Management System platform has been addressed with a Management Engineering approach. In this process, the platform at hand was observed, and the details of the inner workings of the system were noted. Secondly, user groups of the system were interviewed, performance questionnaires of different activities from different user groups were analyzed, and the methodology has been determined. New strategies have been set according to the results, and the student employment rate has been recalculated after six months, which showed an acceptable increase in the new graduate employment rate.

Keywords Career · Skill · Job · University · Employment · Performance

Introduction

The dynamic change in technology and emerging new jobs with the new generation of humankind, it has been extensively important to corporate into career and skills operations as well as student recruitment policies.

Career counselors or career offices use computer software to help students in finding short-term or long-term internships and full-time or part-time jobs. Students

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now conduct their research on employers electronically, and employers have recognized the importance of attractive and informative websites. Even though companies have been using independent employee search websites, they have notices the importance of reaching the university directly and looking for specific students on campus. This actually decreases the time of the initial recruitment process, which will also be explained in the following sections.

The management of the entire campus recruiting process is handled electronically by the ITU Career and Skills Management System called KAYS, managed by the Career Center of Istanbul Technical University linked directly to the Rector.

Although technology makes employer-student communication easier, it also requires a significant investment in the career center in terms of equipment and staff with technical expertise.

This paper will explain a State University Career Center Model in which aims to increase student enrollment in six months after graduation.

Literature Review

Career counseling is a concept that is defined in six stages throughout its history, due to the change in business and working life over time. There are six stages in the development of career counseling in the United States [1]. In the first stage (1890–1919), placement services were offered for an increasingly urban and industrial society. In the second stage (1920–1939), educational guidance through the elementary and secondary schools became the focal point. The third stage (1940–1959) saw the focus shift to colleges and universities and the training of counselors. The fourth stage (1960–1979) was the boom for counseling, and the idea of work having meaning in a person's life came to the forefront; organizational career development began during this period. The fifth stage (1980–1989) saw the beginning of the transition from the industrial age to the information age and the growth of both the independent practice of career counseling and outplacement counseling. The 6th stage (1990—present), with its emphasis on technology and changing demographics, has seen increased sophistication in the uses of technology, the internationalization of career counseling, the beginnings of multicultural career counseling, and the focus on the school-to-job transition [1]. The National Career Development Association [2] defines career counseling as a process of helping individuals develop their lifelong careers by taking into account the definition of the worker role and the interaction of this role with other life roles. Generally, career counseling can be defined as the process of helping individuals to draw a route according to their wishes, interests, and skills in vocational education and work life. Even though the terms such as career counseling, career guidance, career development have different meanings, they are used in the same sense over time, especially because of their close relationship with the period in which they are used. On the other hand, the terms "professional development" or "professional development tasks" was introduced to the literature in Turkey by the end of the twentieth century, and the beginning of the twenty-first century [3].

Turkey has taken America primarily as a role model in the consulting career field after emerging efforts to join the European Union and has started its restructuring actions according to this model, the relevant standard [3].

Career counseling studies in America date back to the beginning of the twentieth century. Important names in this area are first mentioned by Frank Parsons, who is regarded as the pioneer of professional guidance from various sources [4, 5]. Parsons was entitled to receive this title, especially in the last years of his life.

Pope [1], the developments in the career counseling process in America in the following six stages:

(1) Job Placement Services (1890–1919): The important features of this period are the loss of jobs in the agricultural sector about the rapid industrialization and activities, the increasing demand for workers in the heavy industrial areas, and the increasing urbanization. At this point, the focus of various developing institutions is to help individuals who have lost their customers or who do not have a job at this point.

(2) Educational Guidance in Schools (1920–1939): The increase in the birth rate in the period following the end of the First World War led to an increase in school-age children. This situation, together with the increasing labor demand along with the industrial crisis, and the economic crisis in 1930, led to the transfer of vocational guidance activities to schools. The studies in this period are focused on both vocational education and support in the education process.

(3) Education of Universities and Consultants (1940–1959): This period has a more specific orientation than the previous two. One of the biggest reasons for this is that after returning from the Second World War, many soldiers have difficulty in keeping up with social life and work, and after the success of the USSR in space studies, the US decided to accelerate its technological developments. This led the American government to establish Advisory and Guidance Education Institutes, in particular in the fields of science and mathematics, in order to direct the individuals concerned to university education. The American Personnel Service and Guidance Organization (APGA), which currently serves as the American Psychological Counseling Association (ACA), was founded during this period. In this period, in order to bring a new dimension to vocational guidance, career selection and career issues have been directed towards a more individual and psychology oriented direction.

(4) Meaningful Work and Organizational Career Development (1960–1970): The political and social developments in this period, especially young people's interests, has shifted to a meaningful, work that would lead to a change in the world.

(5) Independent Consultancy of Career Counseling and Redeployment Counseling (1980–1989): The period of economic growth in the early 1960s was replaced by a decline in the late 1970s. This is the transition from the industrial age to the age of information and technology. Among the major problems created by this transition are the loss of jobs in the industrial field, the increase in the demand of employers with technological skills, and the loss of job security. Important

work during this period included the report Workforce 2000, published in 1987, which will affect career counseling policies in the next 12-year political process.

(6) 1990—Present: In the late 1980s and early 1990s, career counseling started to become a working area that shifted to a specific direction periodically and became an area that served various aspects of society. These aspects range from the reinstatement of employees in the company's top positions to helping homeless people prepare CVs and include social groups that did not have access to these services and/or did not need them until this time. Another feature of this period is the rapid developments in technology. Facilitating communication among individuals has helped to spread and implement career counseling services more easily. Career counselors in the United States have now been able to spread their services to different countries through these tools through telephone and internet access.

Career Counseling in Turkey

Yeşilyaprak [6], the main purpose of the study Psychological Counseling and Guidance in Turkey "to cultivate productive individuals to serve economic development assistance to choosing a suitable profession to his interests and abilities," have been announced. This view is in line with the rapid growth and economic development approach of the early 1950s, which was the period when the studies were started [7].

(1) 1953–1975: In this process, the first studies in the field of education were primarily aimed at helping vocational orientation. In this period, the interest, intelligence, and talent tests were generally taken from abroad were used by translating and adapting. Studies such as the opening of the Guidance and Research Centers and the studies such as the initiation of related undergraduate and graduate programs in our various universities are also important achievements of this period.

(2) 1976–1994: In this period of time, which Yeşilyaprak [6] called "unstable steps," studies in the field of central guidance and career counseling are aimed at reducing the agglomeration of universities by directing the students to the vocational and technical education institutions suitable for their interests and abilities or directly to business life. In line with this aim, students were introduced to the foreground, and the process of testing and inventory development or adaptation was accelerated. In these years, "Guidance in Education" has also been considered as a separate area of expertise, and undergraduate programs have been opened in various faculties of education in order to train experts in this field. When it comes to adult vocational guidance, studies are mostly carried out in cooperation with Germany. The Turkish Business Association (TEO) slowly started its operation in conjunction with, in 1992, in five provinces, depending on the employees' German Labor Agency of German

experts trained "Business and Professional Consulting Services" was established. The first "Vocational Counseling Center" within TEO (called IŞKUR in Turkish) was established in 1993 in Ankara.

(3) 1995–2010: As a result of efforts to reduce unemployment in the economic sphere and directly related to the efforts to enter the European Union in the political and social sphere, the process has begun to become more systematic, more result-oriented with the change observed in attitudes in this area. Before this point, vocational guidance studies, which were carried out with the aim of acquiring a profession, gained a new dimension and turned towards "holistic career development." This situation has led to various regulations in both primary and secondary education systems and in general. Apart from these, Vocational Guidance and Career Counseling activities in universities have been accelerated. In addition to the publication of the works in these areas, the publication of field-specific textbooks started in this period.

University Career Centers

The foundation of today's career centers is based on the professional guidance work initiated by Frank Parsons at the beginning of the twentieth century and the Central Guidance Bureau established by Parsons in 1908. Developments in the field of the career counseling from the process, and after that, both through the example of Turkey still America, are detailed in a previous section of this study.

In general, career centers can be defined as a part of the management unit of organizations such as schools and companies with a staff of staff providing various career services [8]. This section will focus on career centers focused on the planning and development of students' careers within the university.

The career development centers in Turkey are much newer. The first output of the current form career centers in Turkey, in 1980, "Bureau of Employment for Graduates" with the name of the Middle East Technical University, was established by the office. In 1988, Bilkent University became the first university to establish a career center [9]. This progress was followed by career centers established in different universities with various names and functions. In addition to these studies, a Career Center Meeting was hosted by the Higher Education Council in 2013. In this meeting, it was aimed to increase the awareness and awareness in universities about preparing students for work-life and effective internship practices. Some schools, including Istanbul Technical University, were given examples of the services provided in the career centers.

On the other hand, The Higher Education Counsel called "YÖK" in Turkish has announced on the official newspaper [10] and has sent it to all universities informing them that the National Employment Strategy (2014–2023) and Implication Plan (2017–2019) had come into force on the 7th of July 2017. In accordance with the

4.6 article of this plan, it was stated that the HEC (YÖK) is the responsible counsel to improve guidance on job search and discovery techniques at university career centers.

The good news was that Istanbul technical University Career Center was established within the Faculty of Management in 1997–1998 as Career Office. Since its establishment, it has undergone various processes of change, and in 2013 it was renamed as the ITU Career Center (ITU Kariyer Merkezi website). It still serves under this name today. In 2015, ITU Career Center established a platform called ITU Career and Talent Management System (ITU KAYS) to help ITU students find jobs and internships.

The career center units of the universities stated that their priority objectives were to improve the career planning and development competencies of the mentioned groups. This is followed by studies on the possibilities to be employed, studies on the problems that can be encountered in business life, scientific studies in career areas, contributing to regional development with the development of related institutions, and increasing the respectability and preferability of the university and its members.

As for the purpose of career centers, the services offered by the university also show changes related to the university. Although no specific study has been carried out on this subject, it is likely that this change is due to the resources of the career center, resources such as budget, the primary objectives of the career center, and the expectations of the management from these centers.

As with all individual-oriented services, the benefits and effectiveness of career centers in universities depend on themselves. As a result of the researches, no general study has been found on the interaction rates of students with career centers in the country, region, or university.

Methodology

As the aim of this paper is to increase the higher education employment rate in the first six months after graduation at Istanbul Technical University. Career and skill system electronic platform at hand was observed. The number of applications to job postings was determined. Secondly, user groups, which are companies registered to the university system, were interviewed. Performance questionnaires of different activities from different user groups were analyzed. Also, students one month prior to graduation were questioned to determine the employment rate before graduation. The students with no employment were invited to the career center. These students were counseled, and their CVs were be analyzed and rewritten if needed. Skill and job matches, previous applications, and characteristics of graduates and the culture of companies were analyzed before application, and necessary strategies were applied to increase the employment rate of graduates. Six months later, the same questionnaire was sent to the same sample group to figure out whether if there was an increase in the employment rate.

Sample and Data Collection

As there were different analysis done in this study, there was also a need for having different sample groups. The companies with job and internship postings on the Career and Skill system were selected. ITU KAYS leases the service modules it provides from Symplicity Corporation (https://www.symplicity.com). Student questionnaires were distributed to the students who were presenting their graduation design projects.

As the employment issue deals with complex data input, there were several different data sets collected.

1. Career and Skill System job posting data
2. Student application data to the above postings
3. Number of company participation to the summit, the number of the company, stands specifically in which faculty, number of workshops, number of student participation in each activity.
4. Employer questionnaire regarding the career summit
5. Student questionnaire regarding the career summit
6. Student employment questionnaire one month prior to graduation
7. Student employment questionnaire after six months of graduation.

Analysis and Results

Table 1 shows how many students applied to job postings in the year 2018. The grade division is also shown in the table. It is figured out that sophomore and juniors have the highest application number.

Table 2 shows the total number of applications made within these 1605 students. Year distribution is shown. It is interesting to see that new graduates are still looking for jobs almost at the same rate as junior students. Among these 12,546 applications to total 2017 job postings, Table 3 shows the departmental distribution and number of applications.

On the other hand, we have also analyzed the type of employer job postings, which is shown in Table 4.

The University Career Fair was held on 19–22 February 2018. The following tables show detailed information on participation information (Tables 5 and 6).

Table 1 Number and grade of students applied to job postings in the year 2018

Grade	Number of students applied to job postings
Prep	37
Freshman	108
Sophomore	269
Junior	346

Table 2 Number of applications of the above mentioned 1605 students

Grade	The grand total of applications to job postings
Senior	5263
Freshman	651
Sophomore	1677
Junior	2771
Graduate	2063
Prep	121
Total application to job postings	12,546

Table 3 Departmental distribution and number of applications

Department	Application	Department	Application
Industrial engineering	2587	Geology engineering	55
Electric engineering	1705	Telecommunication engineering	48
Computational science and eng.	1205	Molecular biology	36
Mechanical engineering	975	Ships and ocean engineering	36
Management engineering	908	Architecture	35
Chemical engineering	503	Defense technologies	35
Mathematical engineering	450	Information systems engineering	32
Metallurgical engineering	433	Industrial design engineering	28
Aeronautical engineering	361	Mining engineering	27
Control engineering	327	Textile engineering	26
Physics	228	Nano science	25
Environmental engineering	218	Polymer	24
Astronautica	189	Naval Arch. And engineering	19
Civil engineering	181	Information technologies appl	13
Economics	149	Food engineering	13
Mineral processing	132	Geographical engineering	10
Materials engineering	124	Urban and regional	8
Geomatics engineering	104	Bioengineering	7
Energy science and technology	90	Transport engineering	7
Business administration	80	Disaster and earthquake	6
Metaerogical	77	Coastal sciences engineering	3
Petroleum and natural gas	77	Department name unspecified	878
Mechatronics	72	Total	12,546

Table 4 Type of job postings

Job type	Job applications
Full time	2242
Internship	1536
Part-time	1282
IKZ'18 (ITU career summit)	8984
Total	12,546

Table 5 Number of employers attended career fair and number of touch the talent (TT) activities

Total employer attended to the career fair 2018	168
Number of touch the talent	175

Table 6 Number of employer stands opened in each building

Buildings included in the career fair	Number of employer stands opened
MED—general building on Ayazaga campus	28
Electric—electronic engineering faculty + computer and informatics engineering faculty building	73
Chemical and metallurgical engineering faculty building	24
Mining faculty building	8
Construction faculty building	5
Aeronautics and astronautics engineering faculty building	5
Gümüşsuyu campus (mechanical engineering, textile technology and design faculty building)	46
Maçka campus (management faculty building))	38
Taşkışla campus (architecture faculty building)	3

According to McGrath [12], career and job fairs are another way career services and employers can work together to their mutual benefit. ITU Career fair 2018 was a huge success, with 167 different companies with 230 stand in four different campuses and nine different buildings. The event was open to freshmen through seniors as well as graduates with no employment. This is a way for students to find out more about various employment opportunities. The purpose is for employers is not only to provide career information but to touch the talent on the campus.

The reason for having the highest employment rate is highly linked to student application rate as well as the number of stands of employers in the buildings of those students. This is proved with the employment rate questionnaire results done just before graduation. Table 7 shows the employment rate for each faculty just prior to graduation.

After the result of employment status prior to graduation, a new questionnaire was prepared and distributed among the employer network on the Career Center system.

Table 7 Employment rate for each faculty just prior to graduation

Faculties	Employment status before graduation (May 2018) (%)
Computer and informatics faculty	52.13
Management faculty	47.77
Maritime faculty	35.29
Aeronautics and astronautics faculty	34.48
Architecture and ocean engineering faculty	28.57
Science and letters faculty	27.85
Electric-electronic faculty	25.54
Textile technologies and design faculty	25.53
Mechanical engineering faculty	21.71
Chemical and metallurgical faculty	17.54
Architecture faculty	12.50
Construction faculty	11.55
Mining faculty	9.00

The results showed the strengths and weaknesses of ITU graduates very clearly. Table 8 shows the results of the employer questionnaire.

According to the results seen above, it was planned to start a talent touch program and touch the students who are unemployed but accepted as talented as they are graduates of one of the best three universities in Turkey.

Is it enough for the students to be good engineers when building their career ladder? For the previous generation, this question might be answered yes, but the conditions for being accepted to a job now vary considerably. The twenty-first century is a period of very different competencies. These competencies include factors such as the ability to demonstrate effective communication skills, the ability to cope effectively with stress, the ability to work in a team, and continuous development. We are in a period where we need to keep up with the changes in technology, and this requires us to be open to innovation and change, to be proactive, open to flexibility in job descriptions, and to be able to cope effectively with the inevitable stress situations brought about by the change in our roles and duties. In fact, we see that students do not want to be just "engineers." In the career counseling process, many students are talking about having a number of projects in mind and running their own business rather than working in a company. Therefore, besides engineering skills, skills such as organization and management, crisis management and leadership are becoming increasingly important.

Table 8 Results of the employer questionnaire (% of agreeing to the statement)

Question	Response (% of agree)
Capable of knowing the basic concepts in the professional context and of being able to evaluate the relationship between them	89.4
The development of ITU graduates (in terms of reputation, attractiveness and job opportunities in the market)	95.5
Ability to use necessary devices and computers for engineering applications/analysis/design	95.4
To be informed about contemporary issues	92.3
Ability to communicate in Turkish orally and in writing	90.9
Performance according to other university graduates	89.2
Being aware of professional and ethical responsibility	87.7
Defining the problems related to engineering/professional issues and taking into account economic factors	86.2
To be able to make evaluations regarding engineering/professional issues by considering the global and social impact	86.2
To have sufficient knowledge about quality and environmental issues	86.2
Ability to transfer theoretical knowledge to the application	84.9
Being willing to learn and open to innovation (having acquired the necessity of lifelong learning)	83.9
Ability to communicate in a foreign language (English) orally and in writing	81.8
Having the design skills to meet the system, product and process requirements	81.6
Teamwork/working with different people	80.3
I think students should improve their social skills	75
I think students should improve their foreign language skills	25.9

The Career Center decided to be more effective on soft skills as 75% of employers believed that the graduates are very successful in the technical background, but soft skills are missing. A new plan was set and immediately applied for improving the soft skills, which will also increase the employment rate of graduates. The plan included organizing seminars such as Career Awareness Psychoeducation, CV Preparation, interview performance simulations, personality tests, logical reasoning, self-motivation, coping up with Stress and Decision-Making Skills, time management.

Career counseling services were provided on the subjects such as recognizing the interests of the students, identifying the areas in which their skills are formed, taking steps for the career development steps, identifying which areas are more suitable for them and what skills they should acquire for these areas. Apart from this, necessary support was also provided in CV preparation and interview techniques.

After six months of all the above-mentioned seminars, workshops, face to face mentoring, and career coaching, the same questionnaire was sent to the same

Table 9 Employment rate for each faculty after graduation

Faculties	Employment status after 6 months of graduation (November 2018) (%)
Computer and informatics faculty	82.28
Management faculty	86.51
Textile technologies and design faculty	75.68
Aeronautics and astronautics faculty	70.83
Electric-electronic faculty	63.64
Architecture and ocean engineering faculty	61.11
Maritime faculty	53.85
Mechanical engineering faculty	49.11
Science and letters faculty	45.71
Chemical and metallurgical faculty	41.10
Mining faculty	37.65
Construction faculty	33.04
Architecture faculty	32.50

sample group. The results were satisfying. The table below shows the results of the employment rate after the six month one to one touch (Table 9).

The comparison and the rate of increase after six months of Career Center seminars workshops, talent touch, one to one career counseling, interview simulation, etc., the following table (Table 10) has been formed. The average rate of difference in employment rate after six months has shown almost a 30% increase, proving that Career Center seminars, workshops, talent touch activities, one to one career counseling, interview simulation, etc., have helped students be employed.

Discussion and Conclusion

The aim of the paper was to increase the higher education employment rate in the first six months after graduation at Istanbul Technical University. The importance of career centers at universities was highlighted. The stages of career counseling throughout history were mentioned. The introduction of career counseling in Turkey has been defined. Establishment of university career centers, its stages, and the level of ITU Career Center is touch upon. As the career center units of the universities stated that their priority objective is to improve the career plan and develop competencies of students and graduates, several studies, researches and questionnaires were done to figure out the rate of employment as well as the explanation of low and high employment rates before and after graduation. No general study has been found on the interaction rates of students with career centers and their employment rate.

Table 10 Rate of increase in employment after six months

Faculties	Employment status before graduation (June 2018) (%)	Employment status after 6 months of graduation (November 2018) (%)	Increase in employment after six months (%)
Computer and informatics faculty	52.13	82.28	30.15
Management faculty	47.77	86.51	38.74
Textile technologies and design faculty	25.53	75.68	50.15
Aeronautics and astronautics faculty	34.48	70.83	36.35
Electric-electronic faculty	25.54	63.64	38.10
Architecture and ocean engineering faculty	28.57	61.11	32.54
Maritime faculty	35.29	53.85	18.56
Mechanical engineering faculty	21.71	49.11	27.40
Science and letters faculty	27.85	45.71	17.86
Chemical and metallurgical faculty	17.54	41.10	23.56
Mining faculty	9.00	37.65	28.65
Construction faculty	11.55	33.04	21.49
Architecture faculty	12.50	32.50	20.00
		The average rate of increase	29,50

In this study, different researches were thrown, such as career and skill system job posting data, student application data to these job postings, number of companies attending to the career fair, number of the stands being opened in which building and which campus, number of student participation to each activity, employer questionnaire, student employment questionnaire just before graduation, student employment questionnaire after six months of graduation.

The findings show that soft skills are the missing parts of engineering graduates. In order to support the graduates and increase the employment rate, the ITU Career Center decided to be more effective on soft skills as 75% of employers believed that the graduates are very successful in the technical background, but soft skills are missing. Career Awareness Psychoeducation, CV Preparation, interview performance simulations, personality tests, logical reasoning, self-motivation, coping up with Stress and Decision-Making Skills, time management educations were held. After six months, the same questionnaire to the same sample of students was distributed once again. And the results were strongly positive. The average rate

of increase in employment rate has been found as 30% overall after the ITU Career Center employment strategy.

For further implications, in order to increase the interaction of employers and students or newly graduates, the career fair may be organized twice a year instead of one.

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