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**The American University in Cairo**

**School of Global Affairs and Public Policy**

**HIGHER EDUCATION IN EGYPT AND NEEDED EMPLOYABILITY  
SKILLS IN THE DOMESTIC LABOR MARKET: CASE STUDY FROM  
AIN SHAMS UNIVERSITY, FACULTY OF ENGINEERING**

**A Thesis Submitted to the**

**Public Policy and Administration Department**

**in partial fulfillment of the requirements for the degree of  
Master of Public Policy and Administration**

**By**

**Wafaa Daoud Osman**

**December 2011**

**The American University in Cairo  
School of Global Affairs and Public Policy  
Department of Public Policy and Administration**

**HIGHER EDUCATION IN EGYPT AND NEEDED EMPLOYABILITY SKILLS IN  
THE DOMESTIC LABOR MARKET: CASE STUDY FROM AIN SHAMS  
UNIVERSITY, FACULTY OF ENGINEERING**

**Wafaa Daoud Osman**

**Supervised by Dr. Hamid E. Ali**

**Abstract**

The purpose of this empirical study is to find out to what extent employability skills needed by the domestic market are embedded in the Public University curricula, and especially in Ain Shams, faculty of engineering curricula. In the terms of curriculum improvement the study will be conducted to assess two components: the first component is to figure out the employability skills needed for engineering careers in the domestic labor market in Egypt, and the disadvantages related to the non acquisition of these skills in the career of engineering. The second component is to assess the engineering students' self perceived level of competence at performing the basic employability skills, and whether the skills are embedded in the engineering curriculum or not.

A total of ten Employers and human resources personnel were interviewed to achieve the first component of the study. The interviewers reported that the changing environment of market requires skills in communication, team work, problem solving, planning and organizing, initiative and enterprise, self management, decision making, and technological adoption. They considered the employability skills the meaningful tool for graduate engineers to achieve and maintain successful participation in the workplace

To assess student skill levels, a concessive sample of 140 engineering students from Ain Shams University in Egypt responded to the modified questionnaire "Engineers Generic Employability Skills". The descriptive results indicate that the students have moderate or minor competence in most of the employability skills. Those competences are acquired mostly outside the University. This indicates a need to modify the engineering curriculum to allow for further practice of the employability skills demanded domestically in Egypt.

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## CHAPTER ONE

# *Introduction*

---

In general, the Egyptian youth pursue higher education in hope of landing on a respectable job with a suitable salary to lead a good quality of life. Fifty years ago, during Nasser's era, one could have a very reasonable career after graduating from university, whether from science or arts majors. One could get a job in private or government sectors immediately after graduation. The job would permit the middle class graduate to have a reasonable salary to live, to afford marriage, to purchase a house, to save money and even to have time to practice leisure activities. During those times, graduates did not have problems of unemployment than did individuals with lower levels of education (Hein, 2009).

Though these opportunities began to dissipate starting from Sadat's era, the conditions and security of work have further deteriorated. Graduates have to wait for more than five years to be employed, due to the lack of job opportunities in the government.

Clearly, the case was worse in the last decades of Mubarak's era. The number of graduates entering the labor market increased significantly from 1988 to 2006. About one quarter of Egypt's population is between 18 and 25 years old, moving from education to work (Osman, 2010). Moreover, the economic crisis that faced the world causes these opportunities to withdraw and presented challenges for the youth to obtain suitable jobs whether in the public or private sector. The unemployment declined from 32 percent in 1998 to 24 percent in 2009 (Youth in Egypt: Building our Future, 2010).

These developments underscore the importance of having employability skills as a graduate seeking to be employed, since the competition is very high to obtain a job, and opportunities appear much less promising than those of the previous generations (Handoussa, 2010). The highly ranked business communication skills start from critical thinking, creative problem solving, marketable skills, such as writing (essays, reports, formal e-mails, memos, and more various written work), presenting (solo and in groups), participating in business meetings (negotiating and networking), besides performing well in a team (Stiwne, Jungert, 2010). These skills, in particular, are highly demanded by employers of public and private sectors in Egypt and worldwide. In addition to that one should excel in one or more foreign languages and able to perform the main applications on a computer.



Languages and information technology are the two skill areas that are essential for young people to gain an opportunity in the labor market in developing countries, and increasingly in Egypt. This has been driven by the revolution in ICT and globalization (Radwan, 2002). For example, the perspective of job vacancies in Egypt requiring IT skills and languages increased about 90 percent in 2010 (WorldBank, 2010), especially with the new policy enforced by the government towards establishing the e-government and building a data base in all its ministries on one hand, and with the globalization of business on the other.

Unfortunately, these two main needed skills, besides the other soft skills, are not offered in most public higher education universities, or it may not equip the students with sufficient skills for employment. The absence of these skills in the curriculum will not only result in lower performance of the employee, but also draw back the economic growth. Therefore, developing employability skills that are needed by the job market is an urgent need, and required to be a priority for the Egyptian government and its partners.

On the contrary, our Egyptian curricula may offer some courses which are not related to the real work place. It might be there either to fill the schedule of courses required for the students, or these courses might have been taught for years without any updates to incorporate most recent development. The curriculum needs to be revised and adjusted to the real world (Kenawy, 2006).

Although the Higher Education Enhancement Project 2007 has established models of academic curricula in different public universities, there still are more to be achieved. One of those model curricula is practiced in Ain Shames Engineering School, the focus of my study; however, still some of these curricula lack the employability skills needed by the workplace.

In the majority of public universities, the faculty members prepare their lecture/laboratory booklets for students as the main source of information. These notes include the main content of courses per term. Since only few are available as books in the library, students need to buy these notes. Moreover, some of these texts are not peers reviewed. Thus some might be out of date, and do not include common practice, which are hampering employability skills (Hamid G., 2008).

Although the Higher Education Enhancement Project produced some trial materials of different courses in some institutions reviewed by external examiners according to quality assurance standards, there still are a lot of examples which could be tracked within the

curricula that need to be updated or adjusted to real needs by educational experts (Zaytoun, 2008).

Therefore, the main pillar of the higher education system is to equip students with diverse skills which assist their career flexibility, as graduates to obtain their first job and move from one post to another in their career path. This change to prepare students for lifelong learning is becoming more widely accepted, whereas the links between education and employability skills have been discussed for many years without success (Higgitt, Clark, 1997). Added to the learning skills one should excel in one or more foreign languages and computer skills, and team work skills which unfortunately are not sustainably offered by education systems in the Egyptian universities (World Bank, 2008). On the contrary, the education system offers quantity solution rather than quality development.

Similarly, Coplin (2003) found that employers want to hire the qualified employees with personal potential who perform well in the market and take initiatives in business whatever specialization they acquired. Those qualifications, which are demanded by the employers, needed to be obtained within the university curriculum, and not after graduating.

Does the higher education curriculum prepare the students for the workplace, and do they offer competence of the employability skills effectively, or not? The education system will be under trial especially after the 25<sup>th</sup> January revolution, where the Egyptian citizens are looking for a real reform and change for their future. All want improvement in economic, political and social sectors, and these will only happen by real strategic reform plans especially in the education sector.

## **A. Research Problem**

A closer look reveals that while there is an abundance of labor, the multitude of the Egyptian workforce largely lacks the knowledge and technical expertise that the market demands, not just internationally but also locally (Amin, 2008).

The labor crisis plaguing Egypt runs much deeper than mere unemployment. The high unemployment persists, and various fields in the Egyptian private sector continue to experience acute labor shortages.

Although there are specific issues that contribute to the high unemployment rates of young people in Egypt, these include an increasing youth population, a shrinking public sector, and many other issues (OECD, 2009). The low quality of education and lack of employability skills do not help youth to apply for current jobs (Hamid G., 2008).

## **B. Purpose of the Study**

While all the different dimensions to the problem of deficient employability skills and the synergies between them are important, the research questions are:

- **To what extent the employability skills are embedded in public university curricula in Egypt?**
  - What are the important employability skills needed by the domestic labor market for recruiting fresh graduate engineers?
  - How satisfied are employers with the skills of engineering graduates?
  - What issues are related to the disadvantages of not acquiring those skills?
  - Do the engineering students of Ain Shams University have competence to those employability skills, or not?
  - Where do students learn those skills?

## **C. Research Objectives**

### **First Stage:**

- Identify the important employability skills needed by the domestic job market for engineers.
- Analyze the employers' satisfaction toward the fresh graduate engineers' performance.
- Identify the issues related to the disadvantages of not acquiring those employability skills by the recruited employees, and its impact on the quality of their work.

### **Second Stage:**

- Describe the demographic characteristics of engineering students at Ain Shams University.
- Analyze the students self-perceived level of competence at performing employability skills.

- Identify the environment where the students develop their employability skills that are needed by the workplace.

## D. Definitions of Terms

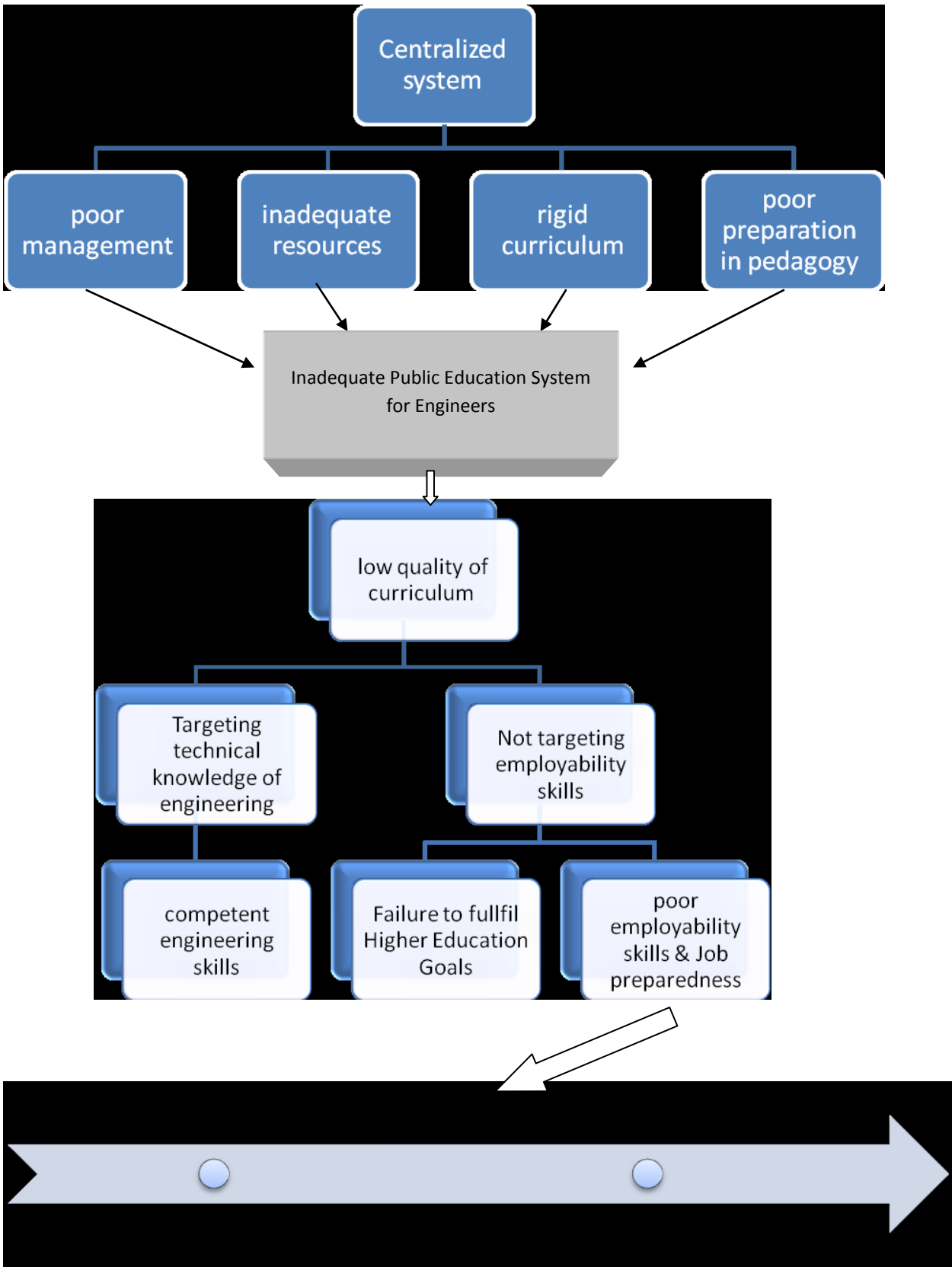
The following terms are defined as they are used in this study:

**Employability skills:** clusters of skills that are needed by the labor market in the 21<sup>st</sup> century. Overtoom ( 2000) defined employability skills as "a group of skills essential for career success to all employees and to all levels of education”.

**Undergraduate engineering curriculum:** A curriculum formalized into a group of courses in an engineering field of study including lecture series, laboratory work, internships, and field experience” (curriculum: Definition form, 2011).

**Communication skills:** is the ability to use the language and express the information, in this study we are concerned about using the communication skills at work orally or written by doing presentations, managing meetings, writing reports, memos, emails, and all other types of written work (Communication Skills Definition, 2011).

E. Conceptual Framework (Figure 1):



## CHAPTER TWO

# *Literature Review*

---

### **A. The needed Employability Skills**

Previous studies indicate that curriculum update must be a continue process. According to Amin (2008) curriculum should be reassessed periodically to keep up with changes and trends in order to avoid passing outdated knowledge and competencies onto students. Brand III (2005) indicates that curriculum should be updated to meet students' needs in the changing workplace. Saravanan (2009) assured that employers questioned the improvement of education curricula in developing employability skills for the engineering graduates. The message from these studies that curriculum should be reviewed to adequately develop students employability skills. Since this employability skills are the main demand of the job market.

Nowadays the nature of the engineering career demands not only purely technical-level training but social business environment as well. Fresh graduate preparation for the engineers need both technical and soft skills to be employed, since to introduce any new product in the market is more than assembling parts together. It needs a process called "*product management*" (Hasan, Dunn, et.al., 2009). This process begins with forming a virtual team working to fulfill the needs of the customer, coming up with innovative ideas, setting up rules of engagement within a system, valuing the diversity of each member in the team, and creating a learning environment to obtain a desirable product in the market at the end.

All these steps need soft skills of critical thinking and problem solving, team work, management, communication, IT, and foreign language skills (Saravanan, 2009). Besides, learning the other engineering concepts, for instances, engineers must practice how to develop the product, calculate aspects, adjust materials, and practice possible failure actions.

Other case studies rather than engineering reveal that there are certain employability skills required by employers to match the labor market demand. In general, those employability skills are assisting everyone entering the market. In many studies, it is defined as "*core skills, generic skills, non technical skills, and/or soft skills*" ( Blom, Saeki, 2010).

The Australian Precision Consultancy Project Team provide in their project report (2007). A discussion of employability skills in higher education which found the following eight employability skills the most needed – communication, teamwork, problem solving, self-management, planning and organizing, technology, life-long learning, and initiative and enterprise skills. These eight employability skills are used to describe the skills of graduate employees from higher education. (Cleary, et.al., 2007).

In the job market, the Academy for Education Development (AED) conducted study to measure the opinion of employers on the skills which the middle technical colleges' graduates have to acquire to match the private sector requirements. A sample of 240 companies was selected based on stratified sampling technique (by size: small, medium, and large). AED sent surveyors to companies for personnel interviews. Ninety-two companies fully completed the survey questionnaire (38 percent response rate). The survey found that the levels of skills demanded by employers prioritize some certain skills of employees, such as problem solving, management, communication, team work, and other more skills (AED, 2008).

Other Egyptian case study assessed the gaps between the demand of employers and the capabilities of master's holders with regard to employability skills (Bremer, El Baradei, 2008). The study provides deeply analysis by dividing the employability skills into three categories: analytic, external relating to communication, and managerial competencies.

In addition, the international labor organization report (2011) indicates that decent work deficits are one of the labor market main challenges in the Arab world. For example, in Egypt the schools, universities, and vocational education and training institutions are turning out graduates lacking the skills that are needed in competitive labor markets (ILO, 2011). These employability skills are for instance IT skills, communicative skills and the other soft skills recommended by the market.

Moreover, one of the higher education enhancement project funds (HEEPF) objective was planning a strategy to reform the agricultural higher education in Egypt. It focused especially on curriculum development and course content, since the agriculture higher education program and curricula are not in step with what the market demand of recent advances in science and technology worldwide. The supply is not matching with the demand of the job market (Abdelallah, 2011).

Ashraf Sheta (2010) in a study developing an Entrepreneurship curriculum in Egypt: the road ahead suggested a project to be running from 2011 till 2015 for developing an entrepreneurship curriculum in Egypt to help students to enter the market with experience of know-how to start a business. This entrepreneurship curriculum is concerned to develop the higher education students' creativity, problem-solving, project development, and innovation competencies. This project targeted the University Public education system. The project called for developing three main courses which in return would be offered to undergraduate students. These courses are " a) *Entrepreneurship and Small Business Management*; b) *Logic and Critical Thinking*; and c) *Innovation*" in all the 19 Public universities and targeting 100,000 of universities students as a pilot project.

Despite the importance of emphasizing the employability skills that interest the employers and to determine the level of graduate engineering students competence before moving on to workplace, I could not find a local study conducted to identify skills needed in the domestic labor market for fresh engineer graduates, or concerned to assess whether the engineering curriculum includes those skills or not.

On the other hand there are quite a few studies on the international level assessing the employability skills of graduate and undergraduate engineers. For instance, an Indian study indicates that the main employability skills required for engineering graduates in India are "*effective communication, problem solving, time management, team spirit, self-confidence, handling criticism, flexibility*" (Saravanan, 2009). The engineers who acquired those soft skills had more of a chance to survive in the competition performance work world rather than those who lacked such skills. Saravanan (2009) recommended in his study for engineers to develop those employability skills in school or to learn the employability skills in a training program after the school to be able to execute work efficiently.

A study in Malaysia specified the lack of employability skills in the engineering curriculum in the university. The study was targeting the initiative and enterprise skills and the interpersonal skills. Those are the skills obtained from the study to meet the employers' requirements in industry. The main generic skills are business communication, teamwork, problem solving, initiative and enterprises, self-management, planning and organizing, technological skills (Hasan, Dunn, et.al., 2009).



Another Malaysian study stated that it would be valuable for engineering employees to participate in a training program which targets their employability skills. This study reveals the lack of employability skills for Malaysian graduate engineers before the training program, and that the industrial training enhances the performance of their employability skills through relevant work experience. The assessment of the employers' opinion indicates the need of such industrial training program before being employed (Yusoff, et.al., 2010). The employability skills mentioned in the study are:

- A. Have adequate background knowledge*
- B. Ability to apply knowledge*
- C. Ability to function effectively in group*
- D. Capability to function as a leader in group*
- E. Ability to carry out leader/ manager's instruction*
- F. Behave professionally and practice good ethics*
- G. Appreciate social and cultural responsibilities*
- H. Awareness on environmental responsibility*
- I. Recognize the needs of lifelong learning*
- J. Ability to extract information*
- K. Ability to practice listening skills and giving feedback*
- L. Ability to communicate in public or with community at large*
- M. Ability to express ideas verbally*
- N. Ability to make decision*

I reviewed selected results of previous international surveys on employability skills that have been conducted for graduates of engineering academic disciplines. Many of these surveys aimed to identify which skills are demanded by employers and to examine how the supply of skills matches the labor market demand." Those skills are characterized by the following factors:" (i) *Core Employability Skills* (which cover generic attitudinal and effective skills, such as management skills, and team-work), and (ii) *Communication Skills* (such as English skills, written and verbal communication)" ( Blom & Saeki, p. 21, 2010).

In this study, the following eight variables were selected for analysis: communication skills, team work skills, problem-solving skills, initiative and enterprise skills, planning and organizing skills, self-management skills, decision making skills, adopting Computer skills.

## **B. Factors associated with the Higher Education Learning System Leading to the Lack of Employability Skills**

Studies proved that obtaining high quality of education leads to increase the mobility of individuals which in return help in developing the nations. The contrary would happen if we are only concerned about quantity rather than quality (BrandIII, 2005).

Despite the fact that the prioritized goal of the higher education is the undergraduates' preparedness as qualified employees and entrepreneurs in the national and global labor market, there are factors which hold back this main goal to be fulfilled (WorldBank, 2010).

Those main factors that hold back obtaining quality of education rather than quantity are the centralized system, the overcrowded classrooms, the low-quality of curricula, the shortage of funds, and more other factors.

### **1. Centralized System**

The Egyptian education is conducted by a centralized system that almost does not allow universities, institutions, and schools to have the ownership of controlling on the decisions of the curriculum, budget, program development and deployment of administrative staff, faculty members or technicians. Most of the decisions are taken by the minister and the board of trustee of each university. The centralized routing system leads to no local-level decisions which in return drive to corruption (OECD, 2009).

This controlled system has not kept pace with the changing nature of the new system of expanding and opening more universities. On the contrary, it became a weak mean to achieve the goals of the government, since there are no local decisions taken when needed (World Bank, 2008).

Although the number of universities in Egypt increased from four main public universities in 1950 to eighteen governorates universities at the present, there is a decline in the quality of education. None of those universities is included in the list of top 500 universities in the

world for the years 2007 to 2009 as Cairo University used to be in the previous years. In 2011 Cairo university is ranking 1, 219 to the world universities (Ranking Web of the World Universities, 2011).

In spite of the establishment of the Egyptian National Authority for Quality Assurance and Accreditation of Education (NAQAAE) in 2007, which targeted to give accreditation to all universities to allow more autonomy to institutions, it still has neither an effective impression nor mandates to improve the performance of universities. Only the American University in Cairo had the accreditation from NAQAAE on April 28, 2011, and lately the faculty of Economic and Political science in June, 2011. However, there are other requests from Egyptian public and private universities and institutions (NAQAAE, 2011).

## **2. Overcrowded Classrooms**

Another main factor is the overcrowding of students in higher education. There is an imperative increasing in the number of students in the higher education. The actual number of students entering higher education grew around 6 percent (60,000 students) per year (WorldBank, 2008). The total estimated number of student enrolled in the Egyptian public universities is 2,371,960 in year 2005/2006 (WorldBank, 2010). Moreover, most of the public universities are overcrowded with students due to the high marks in high schools regardless of their talents or desires.

In the World Bank report, there were data about an expected rise in the higher education students' enrollment. The "Participation will increase from 28 percent to 35 percent over 2006-2021". Moreover, the percentage of the working age of the youth population is estimated to rise from "55 percent in 2007 to 67 percent in 2020" (WorldBank, 2010). This obliged the government to move toward reforming the education system.

This overcrowding is mainly in the sciences, literature, and management majors which lacks balance with the needs of the market, while the market really needs technical and vocational education more as there are not enough qualified graduates in such disciplines.

Table 1 illustrates the number of students enrolled in higher education which shows that there is a great gap between the number of the graduates in some majors and the requirements of the labor market. It highlights the pattern of the students of Thanaweya Amma followed as they enroll themselves according to the field of study which their total results in high school

could fit. It stresses the disproportionate valuing of university education over other types of higher education as engineering sciences. Thus, a new challenge facing the higher education system in Egypt is the mismatch between student's enrolment in different disciplines and the distribution of graduates in different sectors. Distribution of the students is not due to the needs of the domestic market, but because of the grades students obtained in the Thanaweya Amma.

**Table 1: Distribution of students, by major, 2006/07** **Percentage**

<b>Universities, and higher institutes (private and public) 2007</b>		
Engineering sciences	213,545	8.40
Medical sciences	160,997	6.30
Agriculture and Veterinary	53,728	2.10
Basic sciences	49,094	1.90
Cultural and Literature	499,836	19.70
Arts	14,393	0.60
Education	287,765	11.30
Social sciences	1,092,602	43.00
<b>Technical colleges and private middle institutes</b>		
Engineering sciences	52,819	2.10
Social disciplines	117,961	4.60
Total	2,542,740	100%

Source: Strategic Planning Unit database, Ministry of Higher Education.

Therefore, Egyptian policy makers need to support the higher education system to ensure graduate workforce skills development as a source of productivity improvement.

### 3. Curriculum Quality

The curriculum is more or less the same with little real updates from one year to the next. It is completely irrelevant as far as soft skills are concerned, and almost of no use to today's great challenges. The curriculum requires more memorization rather than critical thinking and problem solving.

The memorization learning method is the followed one in our schools (Assaad, Barsoum, 2007) and even in the higher education years. Such ways of learning and teaching impede our graduates to compete in a national and international economy It is assured by employers' complaints that there is a lack of skillful employees in the market (Yusoff, et.al., 2010).

University professors plan their own curriculum with outdated information, which does not give further skills, but merely studying by heart and filling the exam paper at the end of the year by the students (Kenawy, 2006). Most of the engineers' curricula target the engineering concepts and practical aspects rather than professional or employability skills, which graduates need for their future career.

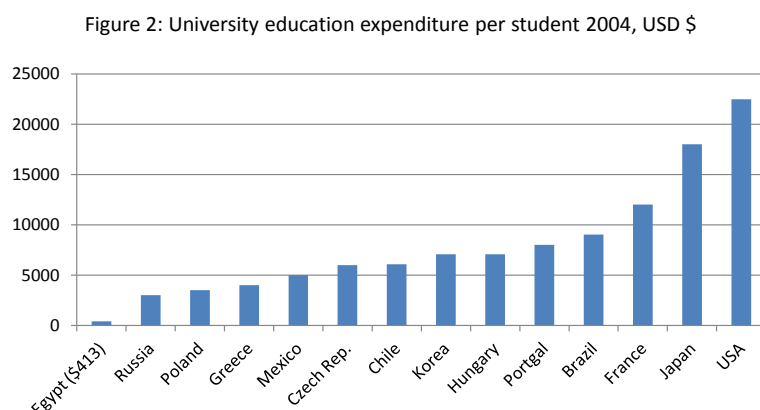
The general concept in the majority of public universities in Egypt does not approach research productivity or innovation by staff members. Besides, the fact that most of the faculties' curriculum is chosen by professors according to the criteria of his/her department, unfortunately, these curricula do not give a space to practice the needed skills for the nowadays employment. Most of the curricula are not updated, and taught for years (Kenawy, 2006).

#### **4. Shortage of Funds**

The main challenge that faces those institutions and universities is the shortage of funds in parallel to the number of students enrolling that is increasing. The education expenditure in 2007 was 6 percent of the Egyptian Government GDP (Ministry of finance, 2011), which is low by international standards. This low funding is one of the aspects behind the poor education infrastructure, unchanged curriculum and unmotivated tutors who are considered the cornerstone for improving the educational process. However, Zaytoun (2008) argues that enhancing the higher education system requires not only more resources, but also real potential of improving the educational system and sets reform policies that provide guidelines for students on what to study for their future career

Expenditure on the higher education student is low as compared with the other developed countries as stated in figure 2.

**Figure 1      Expenditure for Higher Education per Student, 2004**



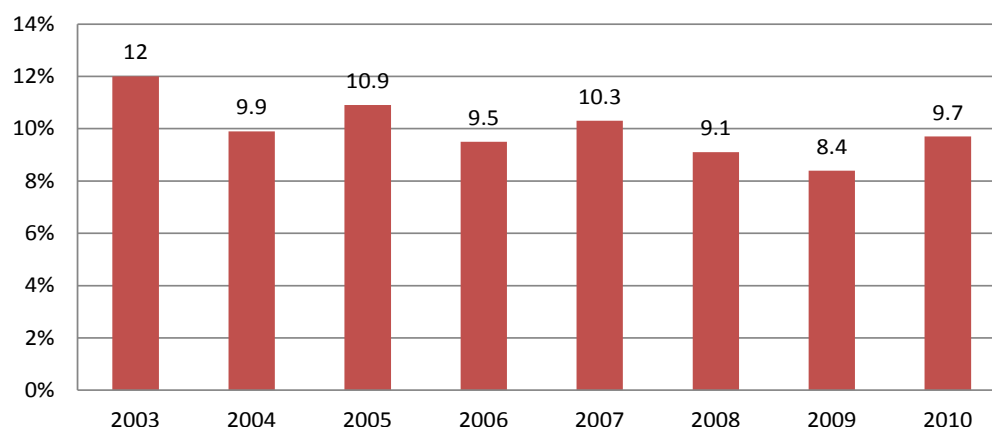
Despite these obstacles the Ministry of Higher Education and Scientific Research, and the Ministry of Communications and Information Technology (MCIT) encouraged to introduce employability skills programs in the tertiary education stage, in a project entitled EduEgypt. This program supported undergraduate training using soft skills, language and technical abilities preparing them for local and global marketplaces. The program targeted only 3,000 for the first year and aims to supply 40,000 per year by 2011; however, this program still did not include the 16,000 graduates in engineering faculties (OECD, 2009).

## **C. Negative Impact on the Domestic Market**

### **1. High Unemployment**

Unemployment of graduates is reflected as one of the most important factors for the lack of the quality of higher education to meet the market needs. CIA World Fact book (2010) disputed official statistics claiming that unemployment rose slightly more than 9.7 percent in 2010.

**Figure 2      Unemployed New University Graduates, 2008 and 2009**



It seems from figure 3 that the highest ratio of unemployment was 12 percent in 2003, and then it decreased a little in 2004, and continued to fluctuate around 0.5percent. The sharpest decreased was from the year 2005 to 2006, it was approximately -2.84 percent due to the fact of a clear increase in the economic situation in Egypt. In 2010 the ratio increased more than in 2009 by 2.48 percent, which is an indicator of the effect of the recession that happened in the world economy.

The indicators show that the private sector is growing rapidly which gives opportunities for employment, yet the unemployment rate stood at 9.4 percent and may be more in the first quarter of 2009. Approximately 2.5 million Egyptians are unemployed, which includes around 650,000 of youth entering the market each year. This indicates that there are job vacancies which could not find qualified graduates (Johnson, 2010).

## **2. Job Vacancies in Egypt**

Although the rate of unemployment is considered to be high in 2010 in comparison with the previous years, Egypt will need to generate 450,000 new jobs each year just to keep its current unemployment rate from rising even higher, there are currently over 100,000 positions unfilled in Egypt's burgeoning textile industry, which is growing at a rate of 30 percent per year (CIA, 2010).

Moreover, there is an immense demand for motivated and capable young professionals at the entry and mid-management levels in the field of banking since there are a lot of local and international banks that are growing exponentially where some are opening dozens of

branches each month in Egypt. Not only the banking and the textile fields are growing, but also the tutoring one. Egypt faces an alarmingly high tutoring shortage.

Last but not least there are dozens of advertisements all the year in public newspaper El-Ahram mainly demanding engineers for different branches. This is due to the fact of the establishment of new private factories and firms in industrial cities all over Egypt.

All these opportunities opened vast job vacancies to many engineering graduates. However, they needed to obtain certain qualifications and experiences to be recruited and that is including employability skills selected for analysis and would be discussed in more details in the following chapters.



## CHAPTER THREE

# *Methodology*

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### **A. Introduction**

This study attempts to investigate in detail most of the employability skills needed by the job market, the level of the employers' satisfaction by the engineering graduates performance, the students' self-perceived employability skills, and the environment of developing the skills represented by the Faculty of Engineering, Ain Shams University. This chapter describes how the field study was designed and conducted including the study variables, modified research instrument, population selection, data collection, and data analysis.

### **B. Design and Plan**

In this respect, the scope of the empirical research basically relies firstly on using a semi structured interview with employers and human resources personnel in private companies to collect information about the main skills required in the domestic job market for newly graduate engineers. I used this method to ensure that nearly the same general areas of information are collected from each interviewee. Then I used this data in the analysis to achieve the goals of the study.

A positive feature about interviews as a qualitative method is that face to face communication which is helpful in terms of facilitating communication, reporting non-verbal communication, and adding the value of the observation factor especially within the field of the research. Furthermore, the moderate numbers of respondents in the interview serves more control and fosters accuracy in terms of better explanation to the questions and provide a better chance of comparing and drawing conclusions.

Second, I used a questionnaire called "Engineers Generic Employability Skills". This questionnaire is modified from three questionnaires of Employability Skills which are the HRM Students at Missouri-Columbia University (Ogbeide, Terry, et.al., 2006), the Generic Transfer Questionnaire (GTQ) (Hasan, Dunn, et.al., 2009) which is used for measuring the employability skills for engineers in Malaysia, and Indicators of Employability skills for

Australian small and medium sized initiative and enterprise skills ( McLeish, 2002). I utilized the questionnaire to match the purpose of the study approach.

I pretested the questionnaire to ensure the reliability of the information on five undergraduate engineers as a pilot work and this provides more focus on the collecting of the data.

The data of the questionnaire is used for the representative study as indicators whether the employability skills are included in the engineering curriculum or not, and measure the satisfaction of students toward the level of the curriculum quality and the students competence of the employability skills.

### **C. The First Method: Semi-structured Interview**

First, I presented the employability variables I collected from the literature review to the employers and Human resources personnel at the interviews. Then I collected their opinion of about the main employability skills needed in the domestic market Second, their opinion about the graduate engineers' performance in the work field to find out if there is a deficiency in their employability skills. The interviews were held separately with each interviewee to give a chance to express his or her opinion openly.

*The following goals are designed to be followed in this stage:*

- Identify the important employability skills needed by the domestic job market for engineers.
- Analyze of the employers' satisfaction toward the fresh graduate engineers' performance.
- Identify the issues related to the disadvantages of not acquiring those employability skills by the recruited employees, and its impact on the quality of their work.

#### **1. Selection of Population Sample**

I interviewed a sample of ten employers and human resources personnel who are seeking employees for engineering vacancies in their workplace. Most of them are managers and general directors of their own business. One is a general manager engineer of an international

company manufacturing luxury private cars. Two of them are engineers working in the field of services, and have their own factories. Three other engineers are the owners of a construction company where their experiences in the field are around 30 - 35 years. They hold the responsibility for the final approval of the new recruitment lists to the departments under their supervision. They should agree about the hired employees.

The four other interviewees are human resources personnel. Three are managers who took the final decision of the recruiting process, and the fourth is a human resources assistant, who has five years experience in hiring qualified engineers.

## **2. Data Collection**

I try to widen my interviews in different industrial famous sites in Cairo where the Ain shams engineering students might be hired after graduation. I selected two main factories in Obour industrial district that are service companies. There I met two employers and a human resources manager. Another factory in 6<sup>th</sup> of October industrial district produces luxury private cars where I met its general manager, the human resources manager and his assistant. Last but not least, three construction companies in El- Tagmoa el Khams district, New Cairo, where I met three employers and one human resources manager. I investigated exactly which skills are needed for the domestic job market, the disadvantages of not recruiting qualified engineering employees, and its impact on the quality of the work.

## **3. The Instrument**

These semi structured interview questions were sought to collect real data about the most required employability skills for engineers in the domestic labor market, and to identify the link between the job market needs and the graduate engineers' qualifications of employability skills.

## **4. Data Analysis**

The qualitative approach, the semi structured interview was essential here for gathering information from the employers and human resources personnel. It helped to encourage the interviewees to share stories and cases in their field of work. The employers were more opened to explain why and how they arrived to their conclusions.

## **D. The Second Method: Modified Questionnaire for Undergraduate Engineering Students**

*The following goals are designed to be followed in this stage:*

- Describe the demographic characteristics of engineering students at Ain Shams University.
- Analyze the students self-perceived level of competence at performing employability skills.
- Identify the environment where the students develop their employability skills that are needed by the workplace.

### **1. Selection of Population Sample**

I distributed the questionnaire among around 160 undergraduate and graduate students in the faculty of engineering, Ain Shams University. The sample was collected randomly from different departments at the faculty. Consideration was also given to have a gender balance of the students.

### **2. Data Collection**

The modified questionnaire was implemented on five students as a pilot move in spring 2011 to measure the reliability of the questionnaire besides the fact that it was utilized from previous questionnaires designed to measure nearly the same hypothesis of this study.

The next step, I distributed the questionnaire on three phases within the third week of September 2011. I analyzed the collected data to answer the structured questions; the information will be on the background of the educational experiences and outcomes of the engineering students which will measure the following:

### **3. Variables**

1. Communication skills
2. Team work
3. Problem-solving skills
4. Initiative and Enterprise skills
5. Planning and organizing skills
6. Self -Management skills

7. Decision making skills
8. Adopt technological skills

#### 4. Grouping the Skills

I conducted the above eight dimension analyses for 40 individual skills. Each five individual skills are grouped into one dimension. Each dimension illustrates 5 questions in the questionnaire.

I grouped the skills because it is preferable and easier to use as a common dimension in analyzing the statistics of the competence of the students. For instance, employers and HR staff often talk about the communication skills as one dimension, while they mean different skills underlying it. For instance, they mean the following skills for the communication dimension: "communicate via writing email, memo, reports etc.", "do effective presentation", "analyze and interpret data" or "listen attentively to others".

Those eight variables do not necessarily represent all the skills needed for the engineering graduates by the domestic labor, but at least they are representing the majority of the skills, which the employers and human resources personnel mentioned in the interview.

#### 5. The Instrument

I used a questionnaire for the field study. This questionnaire consists of two main parts (see Appendix A).

##### Part I

The questionnaire solicits basic information about the student's personal and academic characteristics. Those characteristics included: age, sex, grade level, and months of work experience outside the university.

##### Part 2

- A. *(Column 1)* included items to gather data about the perceptions of the engineering students regarding their level of competence at performing 40 employability skills. The scale of measuring is a five point likert-type with the following response choices as a first part of the instrument: 1 = no competence, 2 = minor competence, 3 = moderate competence, 4 = major competence and 5 = high competence.

- B. **(Column 2)** also assessed the environment where the students' competence of the employability skills inside or outside the university is to be measured whether the curriculum lacks the inclusion of those skills or not. The response choices of this part range from: 5 till 1, where 5 = almost exclusively not learned in the university. And 4 = mostly not learned in the university, which assesses the activities and experiences that are not part of the curriculum and acquired from sources other than those associated with the faculty of engineering academic curriculum. 3 = equally learned in the university and out, while 2 = mostly learned in the university and 1 = almost learned from activities and experiences developed in the academic curriculum.

## 6. Data Analysis

Collected data were processed by using a qualitative approach. Prior to analyzing the data, screening was performed to all hard copies to avoid the missing incomplete data. I used statistical package for social science (SPSS) version 16.0 for Windows. Descriptive statistics were used to analyze the demographic profiles of the engineering undergraduate and graduate students, stating the self competence of performing the employability skills. Moreover, I used the descriptive statistics to specify the environment where the students developed the skills. The percentage of the relations and frequency are mostly used by measuring the amount of the part compared to the whole.

## 7. Scoring Interpretation

The scoring of the students' level of competence at performing the employability skills is from 1 to 5. I used Likert results quantitatively to convert the 5 level scales of competence into binominal using the top two scales (major competence and high competence) as "Yes", while using the bottom three scales (no competence, minor competence & moderate competence) as "No". This is analyzed with the binominal distribution. The scale percentage is used to interpret how many students choose each and compared with the whole to identify the level of the competence in general and measures whether the student had the competence of the skills or not.

Percentage is also used to identify the environment where the students learned and developed the skills. The scoring is from 1 to 5. I used likert results to convert the 5 level scales of the environment into 3 scale by adding the two top scales (mostly learned out of university and almost exclusively learned out of university) as "learned out of university", and using the

bottom two scales (almost exclusively learned in the university and mostly learned in the university) as "learned in university", while leaving the middle scale "Equally learned in and out of university". This scale is used to measure whether the curriculum studied in the university includes the needed employability skills or not.

## **8. Response Rate**

In general the response rate to fill the questionnaire was high about 80 percent. The target population was 160 undergraduate and graduate students in the faculty of engineering, but only 140 handled with almost full response to the questionnaire which has been used in the study. Most of the sample population are senior students in different departments with the same faculty of engineering, Ain Shams University. The questionnaire was directly administrative on three stages within the third week of September 2011.

## **E. Limitations**

The limitation of the research is represented by the likely bias and suspicions affiliated to the topic. Some of the students might have filled the questionnaire due to his/her bias towards their own achievements, since the questionnaire asked to grade their own competence to the skills. Some might not be completely willing to reveal real information, especially the engineering students. Thus, in selecting the sample it will be difficult to tell who are willing to share their real experiences frankly and those who are not.

Another limitation is the large number of the sample students who are expected to fill the questionnaire. The option of meeting them is out of the researcher's relationship since she has to pay a visit to the university more than once, and this needs an official permission, which in return allows only one to two entries. I tried to be introduced to a large number of students as far as possible in each entry.

## CHAPTER FOUR

# *Findings*

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### **A. First Stage: Employer and Human Resources Personnel Interviews**

Collected data are preceded by means of qualitative approach. I scheduled a separate interview with each employer and human resources personnel at their work venue. All of the interviewees were eager to answer all the questions openly since the issue directly affects their work. This was stated clearly in their responses.

The following goals are designed to be followed in the first stage of the study:

- Identify the important employability skills needed by the domestic job market for engineers.
- Analyze of the employers' satisfaction toward the fresh graduate engineers' performance.
- Identify the issues related to the disadvantages of not acquiring those employability skills by the recruited employees, and its impact on the quality of their work.

### **1. Findings Associated with the First Goal**

#### **a. Main Skills Demanded by the Domestic Job Market for Engineers**

Employers were asked about the skills the market demands for the field of engineering and responded with the following eight variables representing around 40 skills:

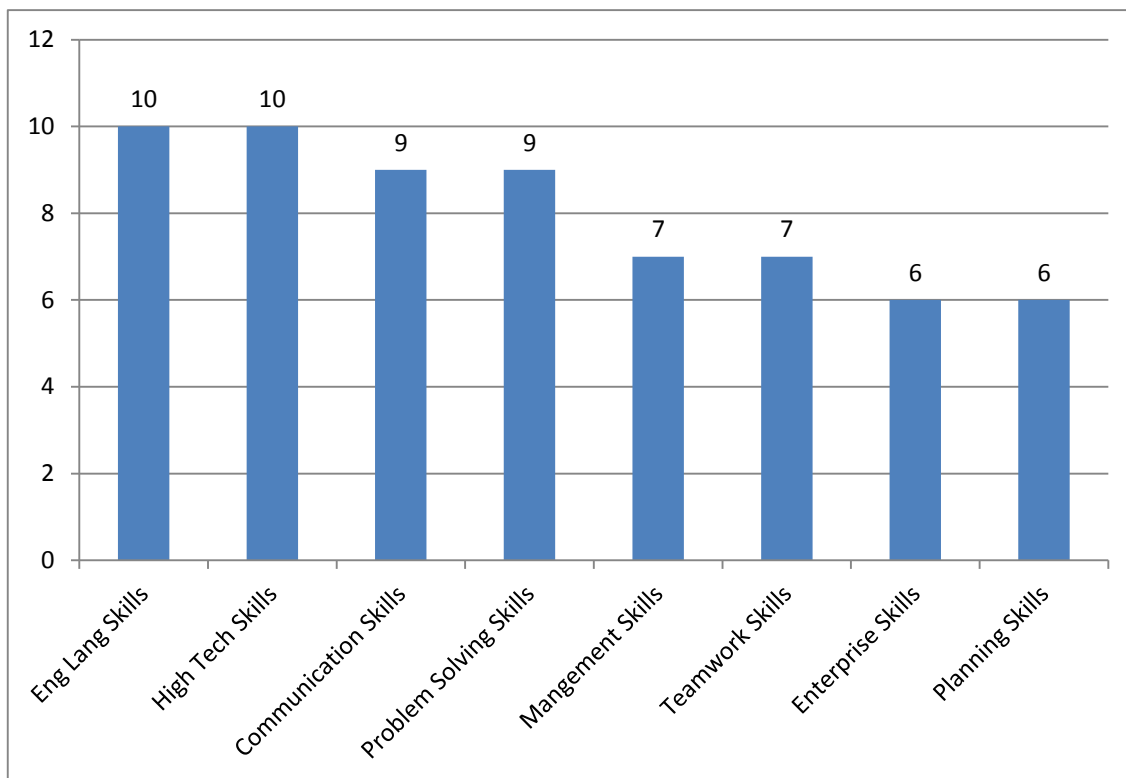
- Ten interviewees emphasized the priority of acquiring communication skills and to excel in English.
- Ten interviewees wanted a basic level of computer skills, especially the ability to use AutoCAD software proficiently.



- Nine of the interviewees stated the importance of problem solving and decision making for new graduate engineers.
- Seven interviewees insisted that management and teamwork skills be acquired by graduate engineers.
- Six employers mentioned the priority of acquiring initiative and enterprise and planning and organization skills by new graduate engineers; however, they said those skills could be acquired on the job.

These implications are illustrated in figure 4:

**Figure 3 Employers and Human Resources Personnel Rank Skills for Engineers**



The employability skills listed in table 2 were grouped into eight main variables. I used the importance rating according to the preference of the interviewed employers and human resources staff. The eight variables do not necessarily represent all skills graduate engineers need. However, these eight variables represent the majority of skills needed by engineers in the domestic market.

Grouping these skills into eight categories is similar to other studies using factors analysis. For instance, as presented in Table 2, Hasan, Dunn, *et al* (2009) grouped skills into managerial, communications, interpersonal, enterprise, technological, teamwork, and problem solving skills. The eight variables I used are the same, though the managerial skills correspond to my management, decision making, and planning and organizing categories. This similarity with the empirical findings from the other study revealed confidence in the classifications of the employability skills.

**Table 1 Skills Grouped into Eight Variables**

Communication	<ul style="list-style-type: none"> <li>• Communicates via presentations, business letters, etc.</li> <li>• Writes memos, reports, and proposals</li> <li>• Listens carefully</li> <li>• Introduces him/herself well</li> <li>• Conveys information to others</li> </ul>
Computer Skills	<ul style="list-style-type: none"> <li>• Uses different office applications</li> <li>• Uses AutoCAD in work effectively</li> <li>• Uses the Internet for research to gather information</li> <li>• Uses technology to process tasks</li> <li>• Has basic computer skills</li> </ul>
Teamwork	<ul style="list-style-type: none"> <li>• Works with peers and in groups</li> <li>• Plays several roles on teams</li> <li>• Shows leadership qualities</li> <li>• Transfers effectively between individual and team assignments</li> <li>• Knows his/her duties and rights within the team</li> </ul>
Problem solving	<ul style="list-style-type: none"> <li>• Identifies problems</li> <li>• Analyzes causes of problems</li> <li>• Shows ability to solve problems</li> <li>• Sorts relevant data to solve problems</li> <li>• Initiates innovative solutions</li> </ul>

Management	<ul style="list-style-type: none"> <li>• Manages/oversee several tasks at once</li> <li>• Punctual in doing assigned tasks</li> <li>• Is flexible in using alternative ways to meet objectives</li> <li>• Sets strategies for doing tasks</li> <li>• Organizes and refines strategies</li> </ul>
Initiative and Enterprise	<ul style="list-style-type: none"> <li>• Analyzes information from different sources</li> <li>• Applies information to new contexts</li> <li>• Initiates change activity within the work process</li> <li>• Designs innovative tools for project work</li> <li>• Uses brainstorming activities effectively</li> </ul>
Planning and Organization	<ul style="list-style-type: none"> <li>• Develops action plans for assigned projects</li> <li>• Plans and organizes events and activities</li> <li>• Establishes clear project goals and deliverables</li> <li>• Sets strategies for doing tasks</li> <li>• Researches literature and collects data</li> </ul>
Decision Making	<ul style="list-style-type: none"> <li>• Makes decisions on time</li> <li>• Analyzes decisions</li> <li>• Identifies political implications</li> <li>• Weighs different priorities</li> <li>• Assesses long-term effects</li> </ul>

The collected data of those skills guided me to outline the questionnaire for undergraduate engineering students in the second stage of this study. I was looking forward to measuring their competence of the skills and to find out whether the engineering curriculum lacked those skills or not.

## 2. Findings Associated with the Second Goal

### a. Does the Skill Set of Engineering Graduates Meet Demand?

Overall, four interviewed employers and one human resource staff person are only "Somewhat Satisfied" with the quality of engineering graduates' employability skills. Two other employers and three human resource staff personnel rate the graduates' employability

skills as "Not at All Satisfied". No one stated "Very Satisfied" with the fresh graduate engineers that they have hired for the last two years.

Young graduates of higher education learn theoretical than practical issues. They study concepts and rules, with little practice. For instance, one employer said: *"To communicate in English, students study vocabularies and learn various responses in English by heart in order to speak the language 'fluently and accurately.' They lack practice."* Another engineer employer said that they do not practice the communications skills well which are needed in the work environment—how to write coherent reports and research, or to make a presentation in English at a satisfactory level. He continued saying, *"My Company has a lot of international deals. Engineers should know English well enough to communicate via e-mail, phone, written report, or presentations"*.

A human resource assistant expressed her dissatisfaction with the level of the fresh graduates' performance. She said, *"During my work experience, I found that graduate engineers lack needed skills due to the pattern of learning in academic study. They do not excel in expressing their opinions or presenting innovative ideas. They do not practice presentation skills within the learning process. They are even very weak at networking. They do not work in groups to complete their projects. They are poor at writing reports."* She continued, saying that sometimes she feels that blue collar laborers are much more experienced and effective in doing the work than the engineers. The graduate engineers need training to learn and practice management skills—teamwork, decision making, and others mentioned above.

A human resource manager said,

Let us take the case of Emad, one of the fresh engineers we hired last year. He completed his Bachelor's Degree in Engineering with a good academic record. He joined our Executive Construction Department, which supervises the implementation process at the construction locations. Most of their work deals in instructing the laborers and in writing a report at the end of the week.

The project manager assigned Emad the task of writing the report and taking over the first implementation process. He expected Emad to work independently and complete this simple mission with minimal assistance, assuming that Emad has the skills to write a report and manage the tasks from his academic background. And the tasks are very simple to finish.

On the job, however, Emad began to make mistakes. He started by giving wrong instructions to the laborers. Deadlines were missed and the work team lost its focus. Emad could not solve the conflict. He did not have the skill to lead the laborers at the work site and many complaints were sent to the project manager. Emad could not solve the technical problems on site. Last but not least, the report he was asked to write was worse. The information was unorganized and misleading. He did not have the skills to express his detailed observations. He focused only on the interface of the report and was unable to write a clear and concise report.

If we reflect on this case, it is clear that the academic curriculum had not provided the skills to allow Emad to practice problem solving at the construction site. He was not trained to lead a team, to handle conflict situations, or to organize a complex job.

The human resources director continued, *"Moreover, the academic curriculum did not develop his communication skills. It did not develop the required skills of writing a cohesive report. This indicates that the engineering academic study relies on providing students with the technical knowledge and neglecting to develop soft skills needed for their future career"*.

An employer for a private construction company believes that Ain Shams, Faculty of Engineering is the best in Egypt. The graduates are well educated. Students are provided with a strong knowledge base. However, the engineering graduates lack the ability to intelligently apply that knowledge in their work. He comments, *"The curricula of the faculty do not include the skills needed by the market"*.

A director for a service company implied that engineering graduates lack computer skills, especially in using important software called AutoCAD, which is used regularly in projects. The employer commented that this software cost the graduates thousands to learn after graduation due to the fact that the universities provide students with low standard of practical work that did not help in the work setting after graduation.

An employer commented that the quality of fresh graduates' education in general is low and is specifically lacking in employability skills. He said, *"Do we look for quantity for the media's benefit or for quality to improve performance that will lead to economic growth?"* He assured the interviewer that fresh graduates lack skills and knowledge and they are not

qualified to work. He said, *"The number of graduates is huge every year"* Educators seem to be concerned about quantity rather than quality.

When questioned, the interviewees implied that critical thinking skills such as problem solving, planning, and organization are the least satisfied, on average. Communication and decision making skills are somewhat satisfied. These findings contradicted with what students indicated in their responses that problem solving was their least satisfactory skill. Fifty-three percent of engineering students responded with "No Competence" when asked about their skills in problem solving and 66.4 percent said they had no competence when it came to self management skills. Forty-five percent of the students respond with "Yes, We Have Competence" on questions about their communication skills and 49 percent said the same about their ability to make decisions. Note that employers and human resources personnel indicated they were "Somewhat Satisfied" about the students' communications and decision-making skills.

### **3. Findings Associated with the Third Goal**

#### **a. Disadvantages of Not Acquiring Employability Skills**

##### ***1. Lack of Efficiency***

When questioned about the disadvantages of not acquiring needed work skills, one employer commented, "Although there is a lot of attention given to higher education in Egyptian society, represented by families that pay more than half of their income for private tuition for their children to pass the national high schools exams to attend higher education at the end of the road, the system, the curricula, and educators need to be developed." This reveals the lack of efficiency and equity in the education system. After many years of reform, the Egyptian educational system can only handle quantity—and that is clear from the huge numbers of students that graduate each year and the increase in the number of universities and institutes through the last decade.

Another employer told that once he had had a discussion with a newly graduated engineering employee called Mohamed. He said, *"Mohamed told me that he used not to attend most of the lectures because of overcrowding. There were thousands of students in some lectures and the professor could not answer all their questions."* He continued, saying, *"This implies how much students suffer to learn, they do not have an appropriate learning environment that*

*helps them move forward in their future career. The lectures are useless, and why should they spend time there?"* The quality of education is not meeting national standards nor is it meeting market needs.

## ***2. No Jobs for Inexperienced Graduates***

Although some of the graduates refuse to work because of low salaries offered, there are also some employers who refuse to recruit inexperienced graduates because they lack the required skills especially for certain jobs such as quality control and planning professionals. One of the interviewees said, *"The recruiter performed the initial screening process, but I took the final decision. I looked over the recruiters' candidates and approved if s/he is qualified or not. I agreed according to the candidate's experience, academic qualifications, and personal skills"*.

Another human resources manager said just the opposite when questioned about whether he preferred recruiting friends and relatives. He said, *"Some really follow such a practice, which leads to unqualified recruitment sometimes. When the employer closes himself into a box called experience, when he has known the employee for years, there is no new blood and no innovation."* Looking at the other side of the coin, the recruited personnel should have experience in researching new products, prices, and technical issues in the market. He/she should be well skilled in negotiation, communication, planning, and management (Higgitt & Clark, 1997).

Certain jobs must be performed by experienced employees such as planning engineers, who should be skilled in using software for design and planning to follow up projects. One employer mentioned that such programs are not taught in our engineering faculties, even though it is necessary for our work. This job title has been known in the market for more than 20 years and there is still no curriculum for it in Egyptian universities.

Sometimes companies have no time for training so they recruit experienced employees for positions. For instance, graduates of the faculties of commerce, law, and arts worked as plumbers, carpenters, and painters because they had experience in such fields. Some of them even work as security guards instead of their certificates. It is their path to obtain a job. The certificate is used in their applications as a reference.

It seems clear that education is not meeting market needs and graduates are finding it hard to be recruited for suitable jobs (Qasem, 1998). A construction employer commented, *"I had a chat once with one employee who works as a daily signature clerk in one of our projects. He used to work as a teacher. This employee did not know how to speak English fluently when I started talking with him. The employee continued that in school he learned a few words and that is what he used to teach to his students—not more. His pronunciation was even below standard."* The employee himself confessed that he learned little English because of the large number of students inside his classroom when he was in school.

### **b. Deficiencies in the Recruitment Process**

On being questioned about how the recruitment process is followed, it seemed that each company has its own path to follow. Lila, a human resources manager, said that her company has advertised on the website of the American Chamber of Commerce for 5 years, and that the resumes of employees stay there for years, so she is able to pick one who is qualified. The human resources assistant in another company said that they used to advertise in *Al-Ahram* newspaper especially for blue collar workers.

Another employer commented: *"It is better to select someone you know than someone you do not."* Although it is unfair to insist on recruiting friends and relatives, this employer decided to openly recruit employees for 3 months as an experiment. He believed this was fair enough for both the employer and employees.

One human resources manager said that he considered this attitude to be unfair, since it depends on knowing the employee in a previous situation, or being told about his/her by relatives or friends, not leaving the process of recruitment to its normal stages. The recruiting process should consist of an advertisement, then choosing the suitable applicant for the job through fair evaluation (Barsoum 2002).

### **c. Training to Fill the Gap**

On questioning employers and human resources staff about how to fill the gap between the low performance of engineering students and market needs, all responded that they insist on in-service training. This is a very important process that all employees should have in their careers (Hamed, 2002). Training helps improve the quality of work, especially for those who are newly recruited. One of the human resources managers said that in his company each



employee has at least one training course per year to develop skills. It should be noted here that there are some real-life jobs for which Egyptian faculties of engineering have no specialized curriculum. If the graduate wants to be hired in one of those jobs s/he has to be inducted, or find somewhere to obtain the necessary skills and training.

One of the employers said, *"If we do not orient our employees and update them with new knowledge, the quality of our work goes down, we will shut down our operations."* He gave me the impression that employee training and induction are essential for work since new graduates lack employability skills.

Another employer said, *"We need to train the new engineers because the quality of education is not enough for graduates. Our field is evolving very quickly, and we should be updated now and then"*.

When questioned about the content of the training programs that engineers should attend, one employer told me that this training is concerned mainly with computer, managerial, problem solving, decision making, and communication skills. The main goals of those training courses is to improve the performance of the employee and to provide him/her with the needed skills, experience, and knowledge to face competition not only on the national level but also on the internationally.

Interviewees indicated that training might take place with the help of different ministries and organizations. One administrative manager said, *"We have funding from the IMC (Industrial Modernization Company), the European Union, and the Ministry of Industry. These agencies pay about 80 percent of the cost of training and the company pays the rest. Those agencies mainly fund training for the employees of exporters and other productive companies"*.

## **B. The Second Stage: Engineering Students' Questionnaire**

The purpose of this second stage in the study is to assess the ability of engineering undergraduate and graduate students in the faculty of engineering at Ain Shams University to use the skills that were identified as those needed for employment. Moreover, the study assessed whether students learned those skills within the university's curricula or outside the campus.

The findings of the second stage of the study include demographic information about the students, descriptive statistics, analyze of the level of the students' competence to use employability skills, and the environment where the students learned those skills.

This stage of the study had the following objectives:

- Describe the demographic characteristics of engineering students at Ain Shams University.
- Analyze the students self-perceived level of competence at performing employability skills.
- Identify the environment where the students develop their employability skills that are needed by the workplace.

## 1. Findings Associated with the First Goal

### a. Demographic Characteristics

The first goal aims to describe the demographic characteristics of undergraduate and graduate students at Ain Shams University's Faculty of Engineering. Characteristics include age, sex, work experience, specialization, stage of study, and level of students at school. I use descriptive statistics to analyze these demographic characteristics. All are reported using frequency and percentage (see table 3).

**Table 2      Student Demographics**

Characteristics	Number	Frequency	Percentage
<b>Age</b>			
1. Less than 20		6	4.5
2. From 20 to 25		122	87.1
3. More than 25		12	8.6
Total	140 respond		
<b>Sex</b>			
1. Male		126	90
2. Female		14	10
Total	140 respond		
<b>Representative Departments</b>			
1. Civil Engineering		2	1.8
2. Electric Power Engineering		54	49.1
3. Structural Engineering		6	5.5
4. Mechanical Power Engineering		22	20.2

5. Computer & Control Engineering		6	5.5
6. Communication Engineering		20	18.2
Total	120 respond 30 missing		
<b>The grade of previous year</b>			
1. Excellent		18	12.86
2. Very good		46	32.86
3. Good		54	38.57
4. Pass		16	11.4
5. Fail		6	4.29
Total	140 respond		
<b>Work experience</b>			
1. Yes		54	38.6
2. No		86	61.4
Total	140 respond		
<b>Duration of work experience in engineering work</b>			
1. No work experience		86	61.4
2. Less than 3 months		27	19.28
3. From 3 – 12 months		19	13.57
4. More than a year		8	5.7
Total	140 respond		

The data in table 3 shows the following information about the 140 total respondents:

1. The age of respondents was divided in three categories (less than 20, from 20 to 25, and elder than 25). Eighty-seven percent of the respondents were between 20 – 25 years of age, 4.3 percent were under 20, and 8.6 percent were graduates older than 25. We can see that the age comprises a reasonable study group, since these students are the same age the employers referred to in their interviews. These are both senior students who are going to graduate in the near future and young graduate students.
2. About 90 percent of the respondents were male. Although I tried to balance gender in my study, the number of male in the sample was greater than female. However, this accurately reflects student distribution in the Faculty of Engineering, Ain Shams University.
3. Most of the engineering departments were represented in the sample, although 30 respondents did not mention their departments. The other 110 respondents represented six departments—civil engineering, 1.8 percent; electrical engineering,

49.1 percent; structural engineering 5.5 percent; mechanical engineering, 20.2 percent; computer and system engineering, 5.5 percent; and communications engineering, 18.2 percent. This wide distribution among various departments gives a good opportunity to know whether the curriculum studied includes the employability skills or not. This goal is achieved by following assessments of the students' responses concerning their competence to use those skills.

4. The average grade of the student sample was good, which indicates that most of the students have a good level of performance in education in general. In the year before the study, 39.7 percent of the students got the grade “Good,” 33.8 percent got “Very Good,” 14 percent got “Excellent,” and only 4.4 percent of the students were marked “Fail.” However, these marks do not reveal if the students' have competence in the employability skills.
5. About 61.4 percent of the students had no work experience before this survey, whether in the field of engineering or not. Only 38.6 had previous experience. Later in the study we compared the response of the students about their competence in using the skills wanted by the market and the ones who responded that they have work experience. That comparison indicated that they learn their employability skills outside of the university.
6. Respondents were asked about how much experience they had in actual work in engineering. Nearly 61.4 percent stated they had not worked before. About 13.57 percent of students had 3–12 months of experience; 19.28 percent had less than 3 months experience; and the rest (5.7 percent) had worked for more than a year. If we add the samples who were not working before with those who had less than 3 months of experience ( $61.4 + 19.28$ ) almost 80.7 percent of the students had no experience in work before.

## 2. Findings Associated with the Second Goal

### a. Grading the Students' Skill Competence

The second objective was mainly to describe the ability of engineering students to perform the identified skills desired by the workplace. The following tables and charts present the frequency and percentage of each level of competence to perform the employability skills,

and followed by whether it is developed in or out of the university. This reflects the response of the students to the two parts of the study questionnaire.

The students' skills have been broken out into the eight categories previously identified:

1. Communications
2. Computer Skills
3. Decision making
4. Problem solving
5. Self management
6. Teamwork
7. Initiative and enterprise
8. Planning and organization.

We constructed an index for each dimension using a simple index procedure that depends on the sum of the values of the variables that constitute the underlying dimension. The dimension's index can be constructed by adding the students' answers to the five questions that measure each skill.

We found the dimension's value ranges from 0 – 5. This scale is divided into two categories (**Yes** and **No**). **Yes** means “yes we have competence”, and **No** means “no we do not have competence” to mimic the scale of the original five questions for the following variables:

1. From 0 to 2 in the questionnaire represents **No** and **Minor Competence**, and is equivalent to **No Competence**.
2. From 3 to 5 in the questionnaire represents **Moderate**, **High**, and **Very High Competence**, and is equivalent to **Yes I have Competence**.

### ***1. Communication Skills***

To study this skill, we depended on the following questions on the student questionnaire:

(The student responds that he/she can)

1. Make effective presentation to my professor and colleagues.
2. Convey information one-to-one.

3. Write research papers, memos, and reports in English.
4. Use proper grammar, spelling, and punctuation.
5. Listen attentively to others.

Figure 5 shows graphically the results of the survey.

**Figure 4      Students' Communication Skills**

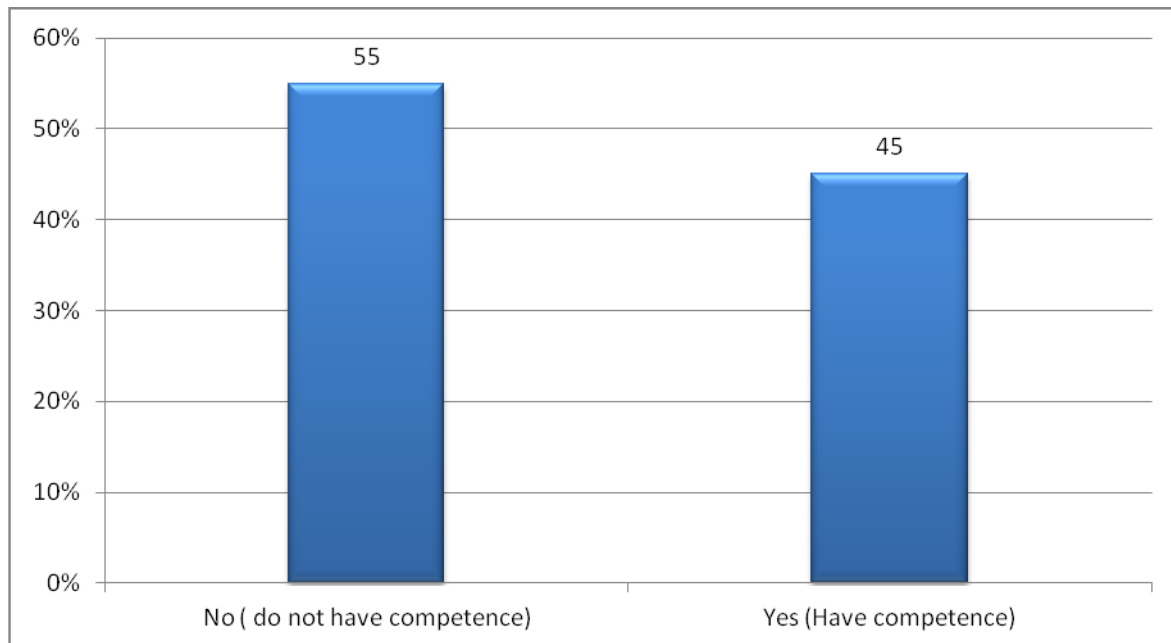


Figure 5 shows the answers given by the engineering students to the dimension of communication skills. Only 134 students in our sample responded to the 5 questions. Of them, 55 percent had no competence and only 45 percent stated that they do have competence.

Comparing these student results with the interviews with employers and human resources respondents, the latter implied they were "somewhat satisfied" with the level of students' performance, This seems to correlate with the students' responses, since round 45 percent of the sample replied **Yes I have Competence** using communication skills .

## **2. Teamwork**

To study this skill, we depended on the following questions:

(The student responds that he/she is)

1. Used to doing assigned projects alone
2. Used to doing tasks with peers and within groups
3. Able to set rules of engagement among assignment teams
4. Able to play several roles on a team
5. Able to transfer effectively between individual and team assignments.

Figure 6 shows the students' aggregate responses to those questions.

**Figure 5      Students' Teamwork Skills**

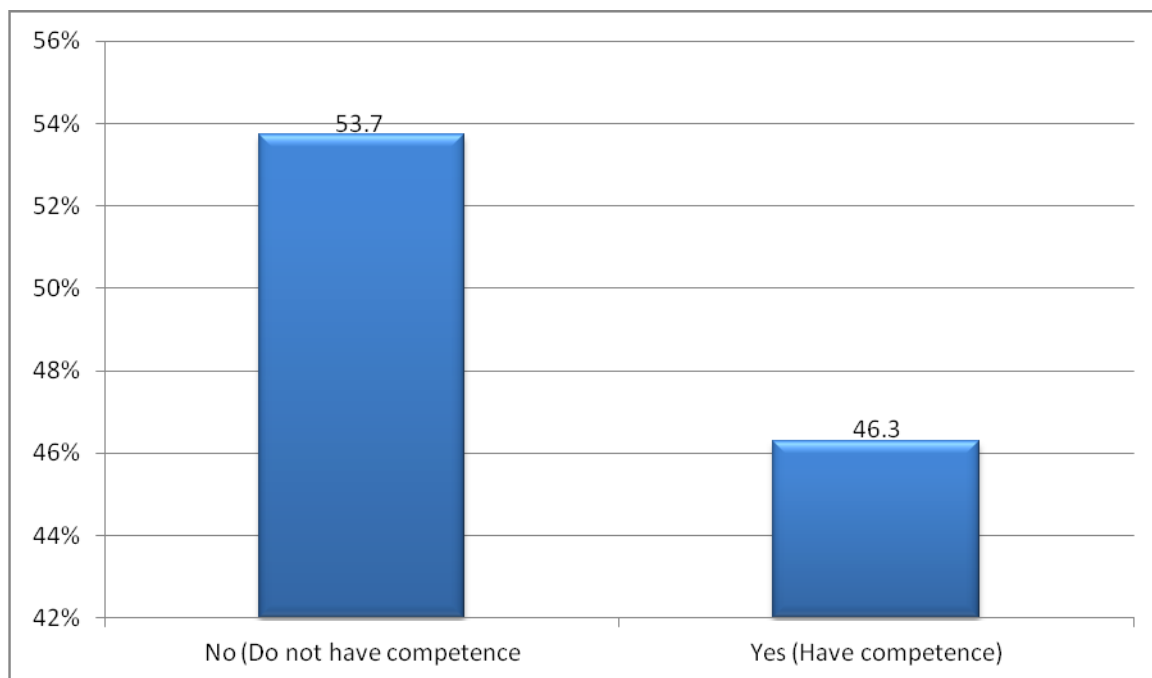


Figure 6 implies that about 53.7 percent of the students have **No Competence** in working with teams, while 46.3 percent of the students respond **Yes** regarding this skill. Although 126 students only answered the questions relevant to this skill, the **No Competence** percentage is still high compared to the total number of students surveyed. This reveals that the engineering curriculum includes few activities that develop teamwork skills.

On questioning employers and human resources personnel, they emphasized that students should develop their teamwork skills, since most projects are completed through teamwork.

### **3. Problem Solving**

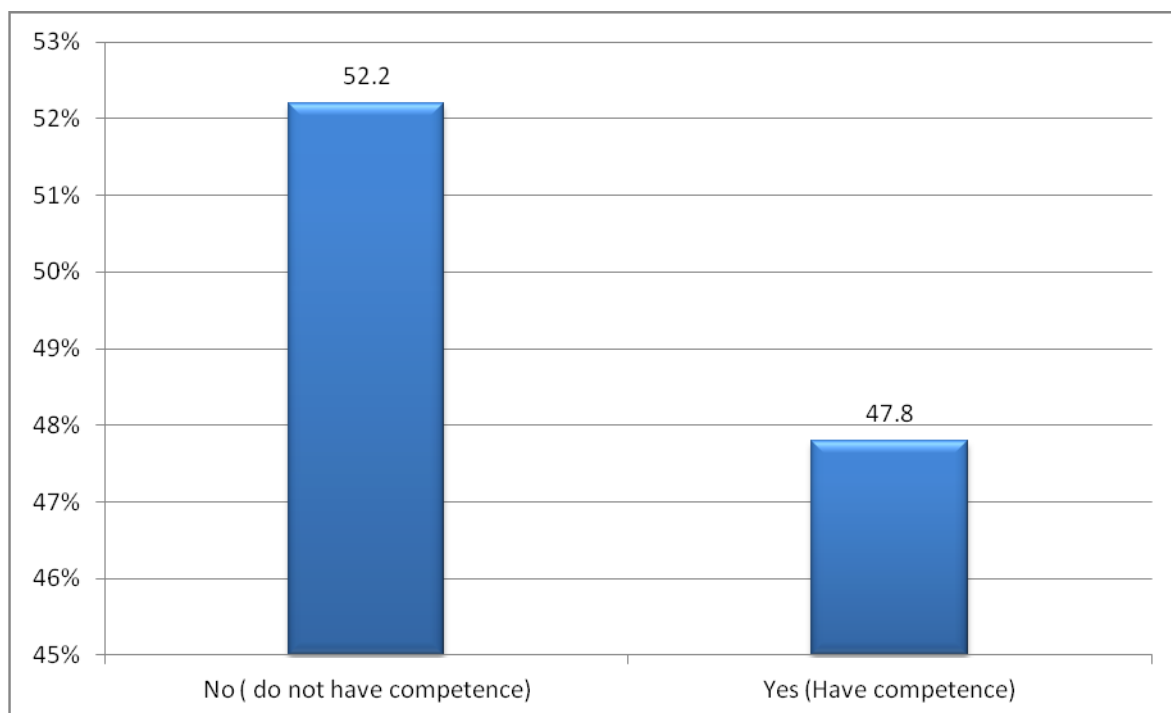
To study this skill we depend on the questions:

(The student responds that he/she can)

1. Identify problems
2. Identify essential components of a problem
3. Show independence in solving problems
4. Sort out the relevant data to solve a problem
5. Has used various problem-solving techniques and tools before.

Figure 7 shows the breakdown in the student's problem solving skills.

**Figure 6      Students' Problem Solving Skills**



Questioning the students about their level of competence in problem solving skills, about 52.2 percent of the students responded they had **No Competence**, and 47.8 percent said **Yes I Have Competence**.

Comparing the results of the student survey with the responses given by the employers and human resources personnel, we find that the employers' opinion is slightly opposite from the student responses. Employers were not satisfied about the level of the graduates' performance implementing problem solving skills. Moreover, the figures indicate that the Faculty of Engineering's curricula is not helping the students improve their problem solving skills.



#### 4. Initiative and Enterprise Skills

To study this skill we depended on the following questions:

(The student responds that he/she can)

1. Use brainstorming activities effectively
2. Analyze information from different sources
3. Apply information to new contexts
4. Initiate change activity within the learning process
5. Design innovative tools for class work.

Figure 8 shows the student's aggregate responses:

**Figure 7      Students' Initiative and Enterprise Skills**

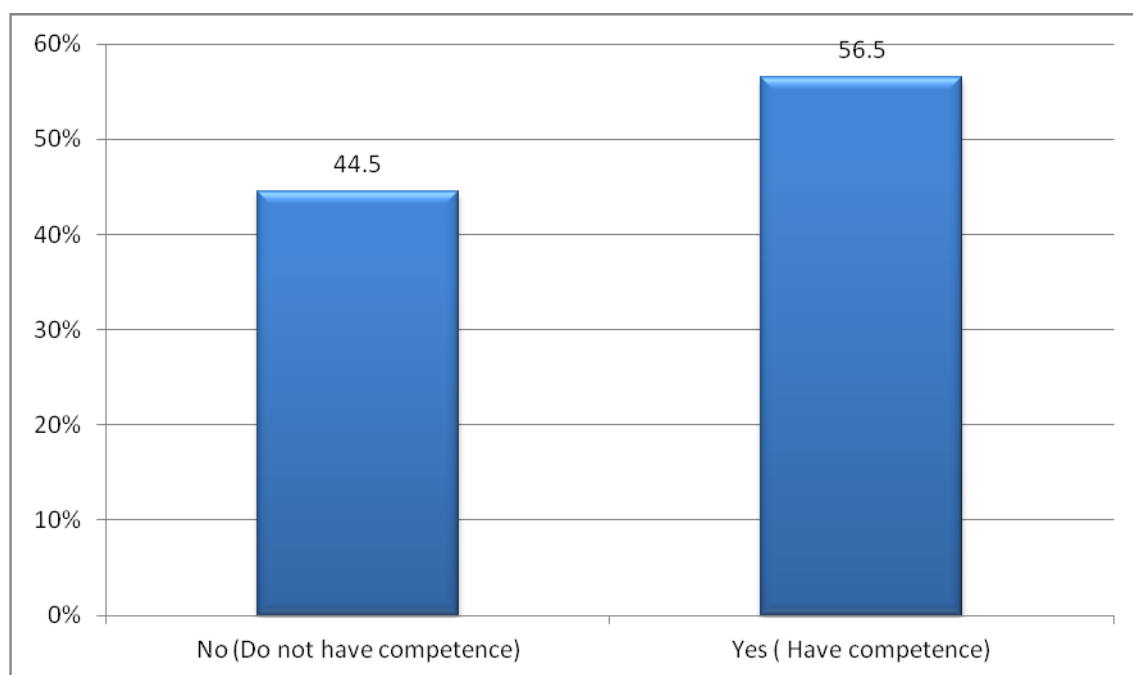


Figure 8 shows that about 56.5 percent of students have **No Competence** in using initiative and enterprise skills, while 44.5 percent responded **Yes I have Competence**. This indicates that students consider themselves somewhat qualified in this skill.

Comparing the student response to the employer interviews, we found that the results disagreed with what the employers indicated, but only slightly. We suspect this is the students' bias towards their abilities and they need more practice to improve their performance in order to satisfy their employers.

## 5. Planning and Organization

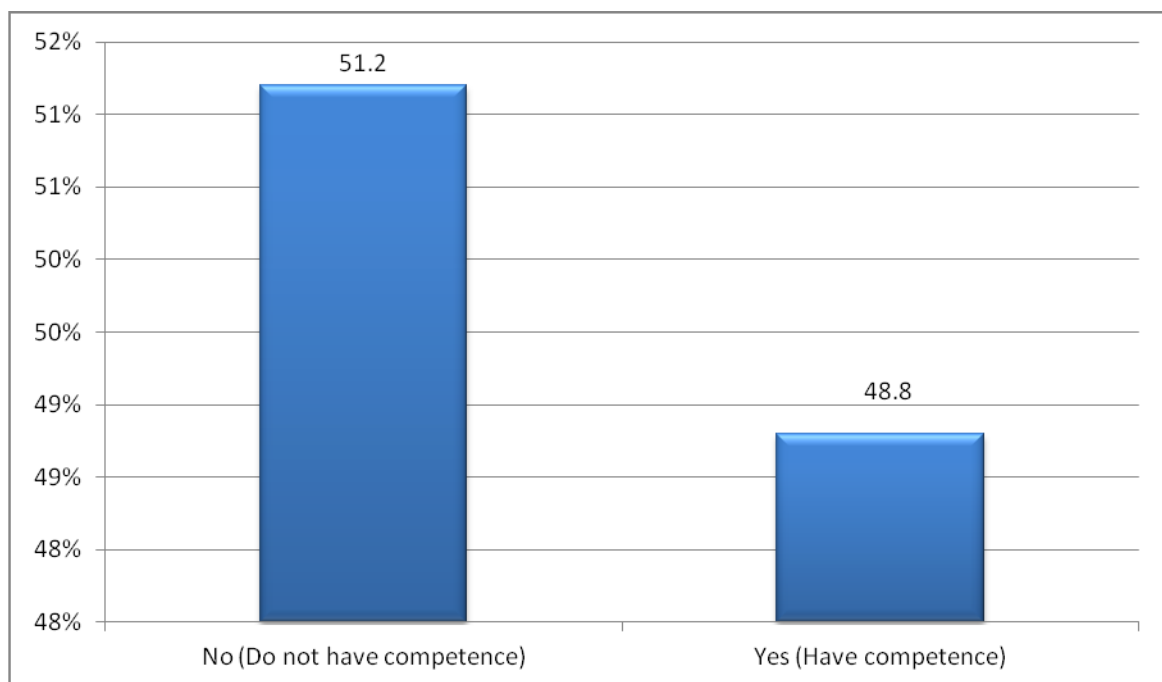
The following questions were related to this skill:

(The student responds that he/she can)

1. Do research and data collection
2. Develop action plans for projects assigned by the professor
3. Plan and organize events and activities
4. Establish clear project goals and deliverables
5. Set strategies for doing tasks.

Figure 9 shows the student responses:

**Figure 8      Students' Planning and Organization Skills**



When we asked the students to grade their level of competence in planning and organization skills, about 51.2 percent said **No Competence**, and 48.8 percent responded **Yes I Have Competence**. This means they have little actual work experience since these skills need practical training to be developed. Investigating whether the university helped them find summer work to improve such skills, we found the university is not offering such services.

## 6. Self Management

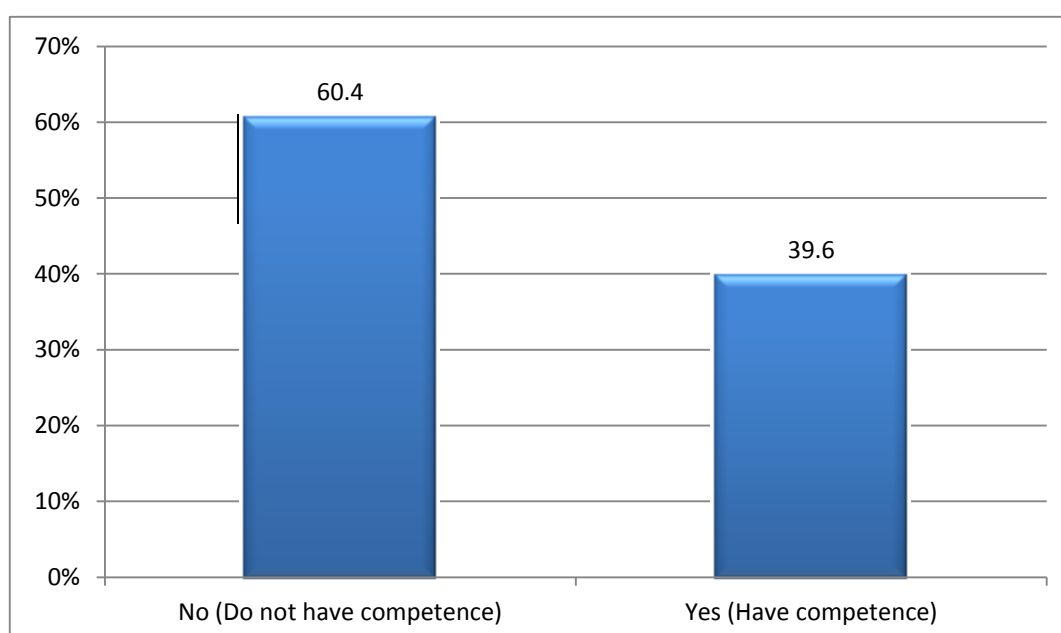
To study this skill we looked at the following questions:

(The student responds that he/she can)

1. Organizing strategies for him/herself
2. Set priorities
3. Manage/oversee several tasks at once
4. Be punctual in doing assigned tasks
5. Estimate alternative ways to meet objectives.

Figure 10 shows the results of the student survey.

**Figure 9      Students' Self Management Skills**



About 60.4 percent of the students replied they had **No Competence** in self management skills; 39.6 percent said **Yes I have Competence**. The gap between the two groups is greater than for previous questions, indicating that the students need more practice in such skills.

## ***7. Decision-making***

To study this skill we looked at the following questions:

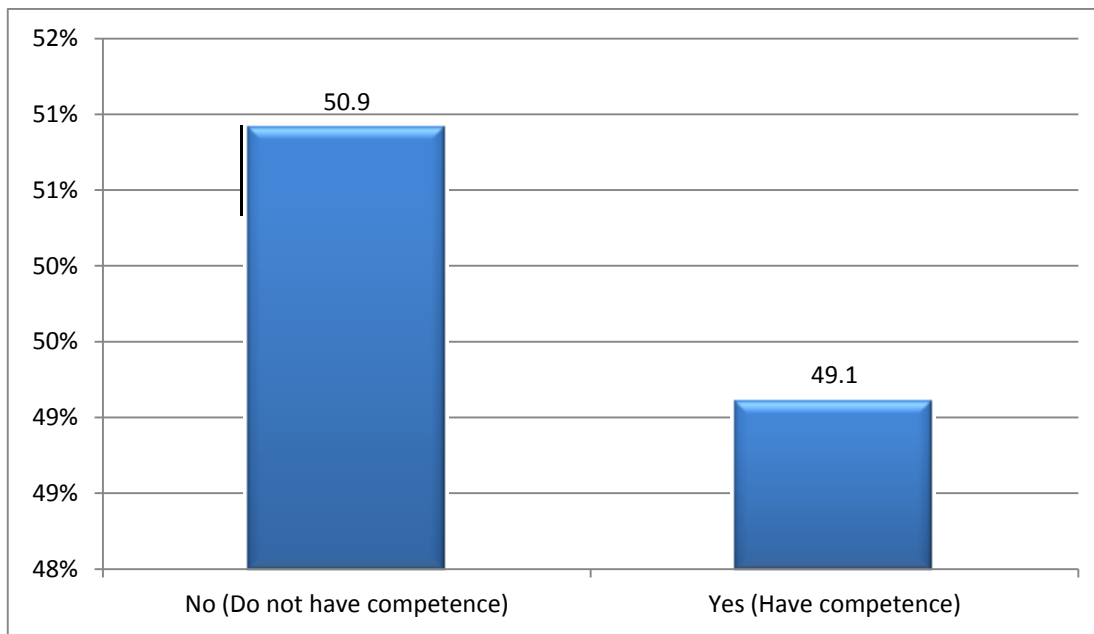
(The student responds that he/she can)

1. Make decisions in a short time period
2. Assess the long-term effects of his/her decisions
3. Make decisions on the basis of analysis

4. Identify political implications of the decision
5. Analyze the effects of decisions.

Figure 11 compares the students' evaluation of their competencies.

**Figure 10 Students' Decision-making Skills**



About 50.9 percent of the students said they had **No Competence** in decision-making skills, while 49.1 percent thought that **Yes I Have Competence**.

Comparing the results of the student survey with the interview results with employers and human resource personnel, we saw that the employers' opinion matches the student responses. Neither group was satisfied with the level of engineering graduates' performance in implementing decision making skills.

Nearly all the students answered the question about making decisions in a short time that they had **No Competence**, indicating that engineering students need to develop their personal performance regarding this skill.

## ***8. Computer Skills***

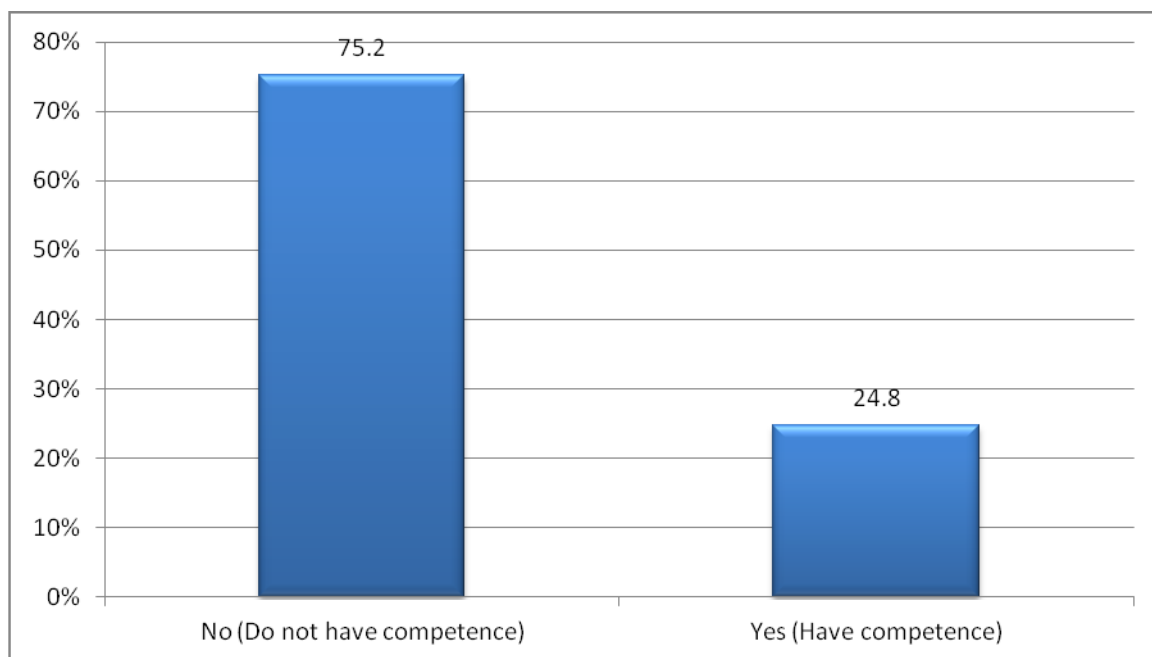
To study this skill we depended on the following questions:

(The student responds that he/she can)

1. Surf the Internet to gather data for class tasks
2. Use AutoCAD software effectively
3. Use technology to seek, process, and present class tasks
4. Use different software applications to complete class assignments
5. Design his/her website.

Figure 12 breaks out the students' assessments of their competencies.

**Figure 11 Students' Computer Skills**



About 75.2 percent of the students answered they had **No Competence** with Computer skills; only 24.8 percent said **Yes I Have Competence**. Questioning the students to assess their ability to use AutoCAD software—one of the things employers want most in their new graduate employees—most said they had **No Competence**. This indicates that a deficiency in the curriculum.

### 3. Findings associated with the Third Goal:

#### a. Where Were the Skills Needed for Employment Developed?

The second part of the study indicates where students developed the skills of the eight variables. The charts in this section indicate whether each category of skills was learned—in the university, at work, or in both—for the students who indicated they were competent in that area. Moreover, we construct an index for each dimension using simple index procedure which depends on the sum of the values of the variables that constitute the underlying dimension.

Each dimension's index is constructed by adding students' answers to the five questions that measure each skill. We found that the subjective value ranges from 5 – 22. We divided this scale into three categories to mimic the scale of the original five questions for each category:

1. 5–10 indicates **Learned in University**
2. 11–16 indicates **Learned Equally in School and Out of University**
3. 17–22 indicates **Learned Out of University**.

#### 1. *Communication Skills*

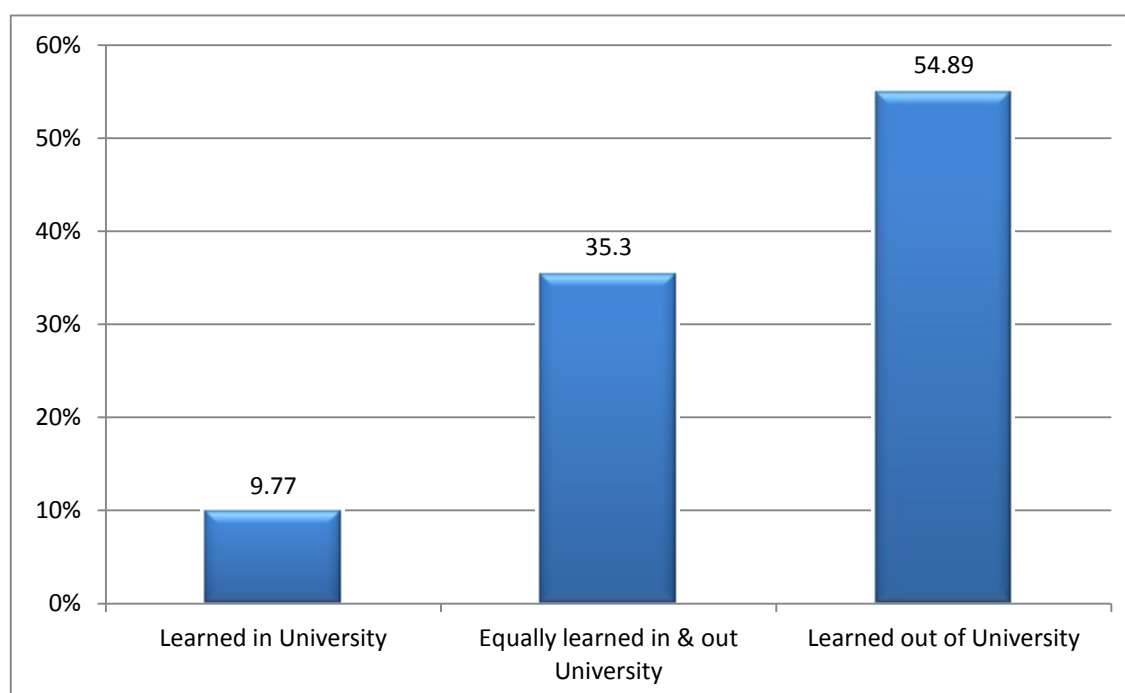
To study this skill we depended on the following questions:

(The student responds that he/she can)

1. Make effective presentations to my professor and colleagues
2. Convey information in one-to-one situations
3. Write research papers, memos, and reports in English
4. Use proper grammar, spelling, and punctuation
5. Listen attentively to others.

Figure 13 shows the students' responses graphically.

**Figure 12 Where Students Developed Communications Skills**



Students who said they had some competence in communications skills responded that 54.89 percent mostly **Learned this skill Out of University** and 35.3 percent **Learned Equally In and Out of University**, while about 9.77 percent of the sample **Learned In University**.

Because the students seemed to mostly be learning these skills outside of their university classes, we could conclude that the engineering curriculum does not include enough communication skills activities to help students develop these skills.

## **2. Teamwork**

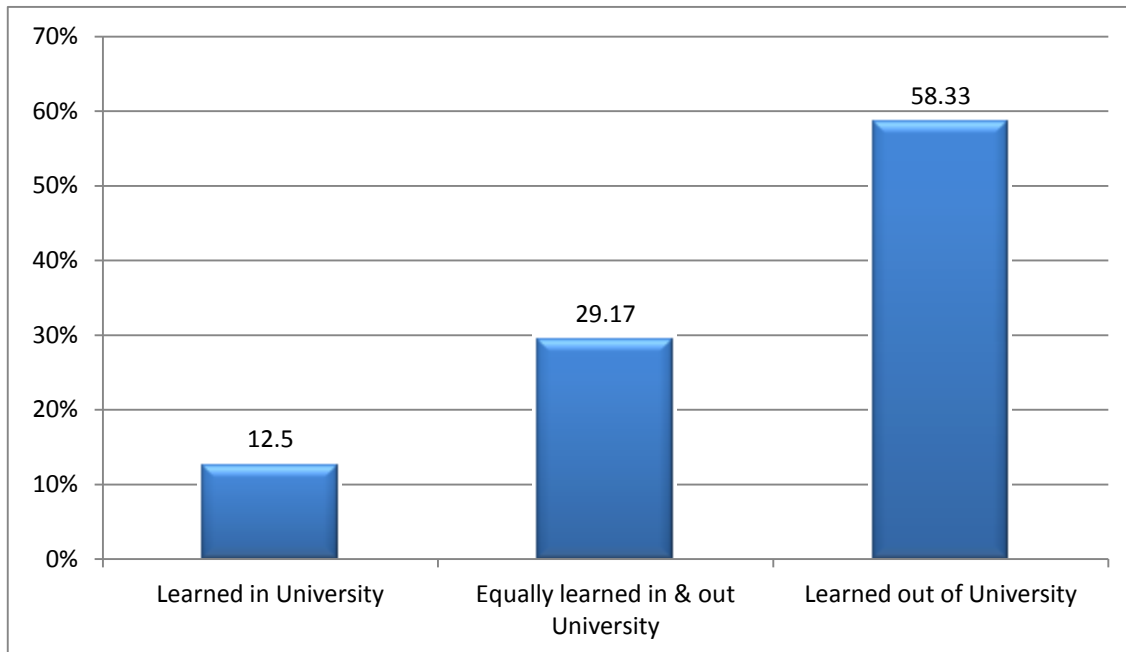
To learn where the engineering students obtained this skill, we asked:

(The student responds that he/she can)

1. Do assigned projects alone
2. Perform tasks with peers and within groups
3. Set rules of engagement among assignment teams
4. Play several roles on teams
5. Transfer effectively between individual and team assignments.

Figure 14 illustrates the percentage of students who learned this skill set in the various locations.

**Figure 13 Where Students Developed Teamwork Skills**



Twelve-and-one-half percent of the students responding that they had learned some teamwork skills said those skills were **Learned in the University**; 29.17 percent learned the skills **Equally In and Outside the University**. This indicates that the engineering curriculum includes some activities to develop students' teamwork skills. However, these activities seem insufficient to provide the skills needed for the job market.

Note that the majority lack competence in these skills. Figure 14 shows that for 58.33 percent of the students, teamwork skills were **Learned Out of University**. Comparing this percentage of students to their responses to the question of having previous work experience, we found that they could develop the skills while working outside the university.

### **3. Problem Solving**

To study this skill we looked at these questions:

(The student responds that he/she can)

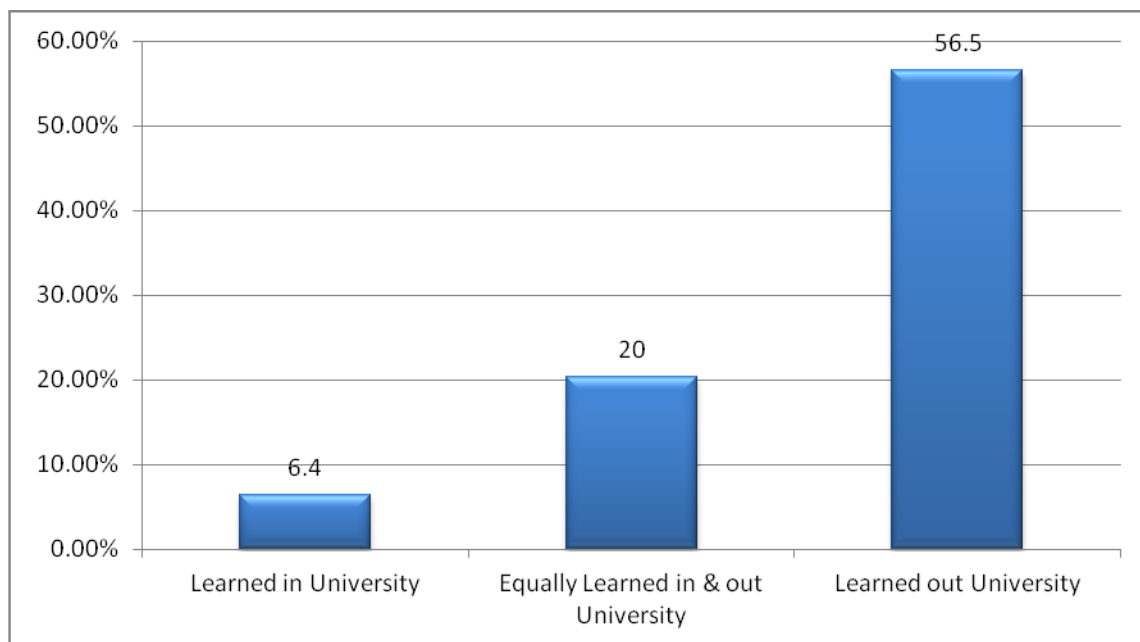
1. Identify problems
2. Identify essential components of a problem



3. Show independence in solving problems
4. Sort out the relevant data to solve a problem
5. Use various problem solving techniques and tools.

Figure 15 indicates where students (who said they had some competence) learned these skills.

**Figure 14 Where Students Developed Problem Solving Skills**



About 20.8 percent of the students who claimed problem solving skills **Learned Equally in and outside the University**. Their respond indicated that 56.5 percent of the sample **Learned the skill out of University**; and only 6.4 percent of the students **Learned in the University**.

#### ***4. Initiative and Enterprise***

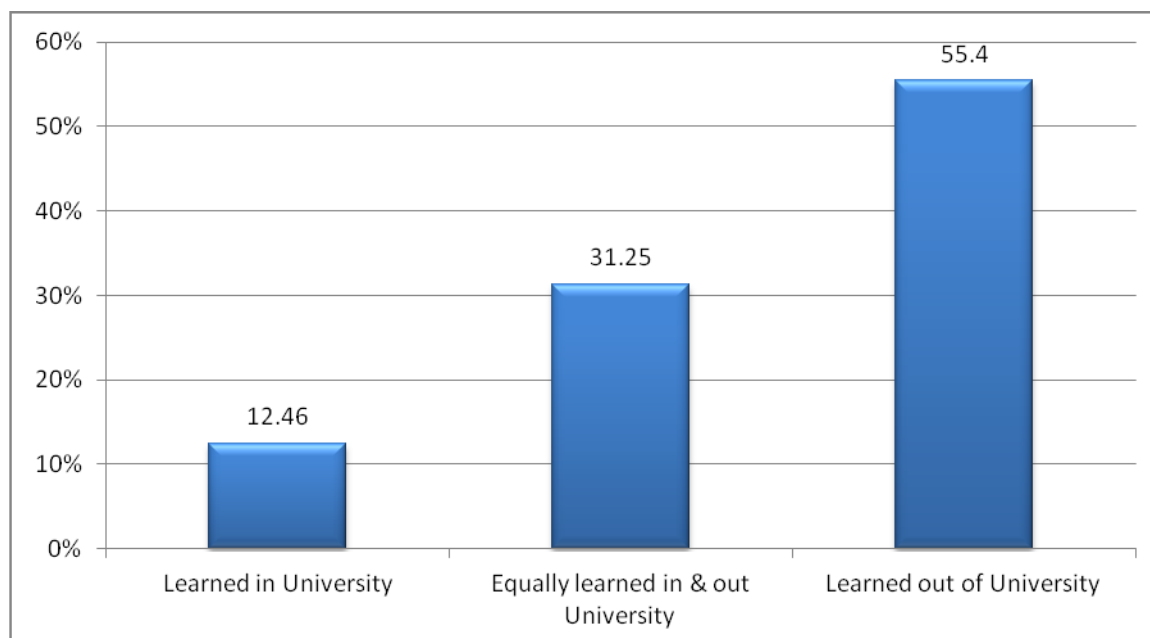
To study this skill we looked at the following questions:

(The student responds that he/she can)

1. Use brainstorming activities effectively
2. Analyze information from different sources
3. Apply information to new contexts
4. Initiate change activity within the learning process
5. Design innovative tools for class work.

Figure 16 breaks out the percentage of students that learned these skills in the various locations identified:

**Figure 15 Where Students Learned Initiative and Enterprise Skills**



Obviously about 55.4 percent of the students are learned initiative and enterprise skills **Out of University**; 31.25 percent **Learned Equally In and Out of the University**, while only 12.46 percent **Learned In the University**.

### ***5. Planning and Organization***

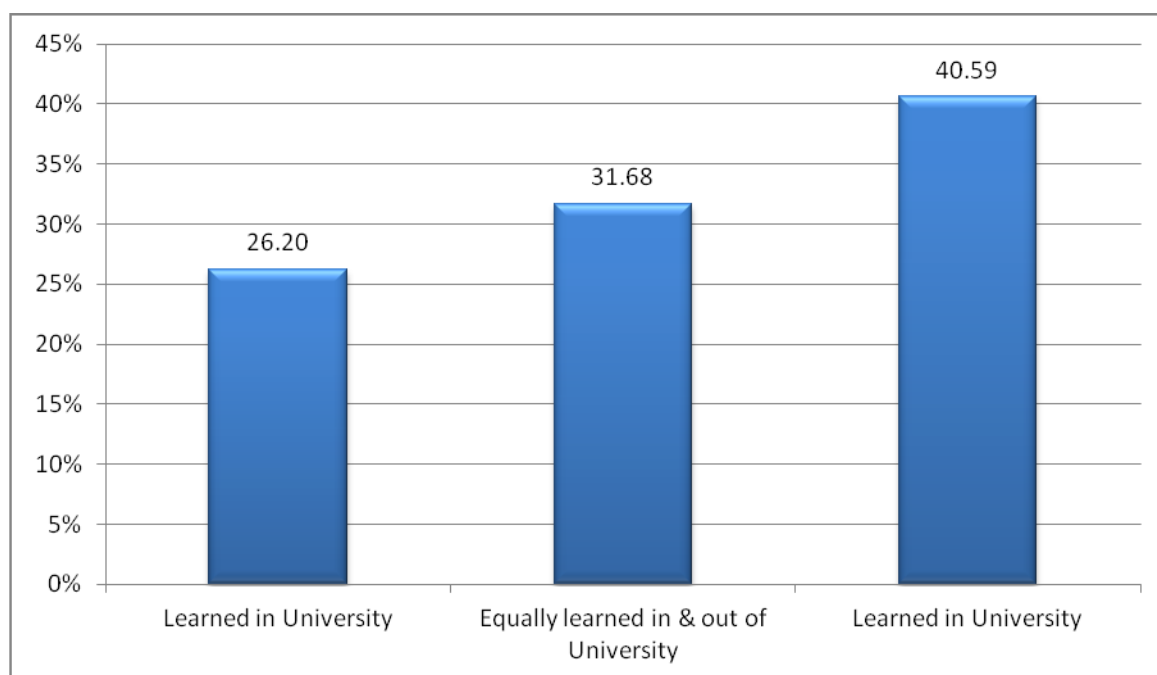
To learn where students who claimed competence in these skills had learned them, we studied these questions:

(The student responds that he/she can)

1. Perform research and collect data
2. Develop action plans for projects assigned by the professor
3. Plan and organize events and activities
4. Establish clear project goals and deliverables
5. Set strategies for doing tasks.

Figure 17 indicates where the students that claimed to be competent in these skills learned to use them.

**Figure 16 Where Students Learned Planning and Organization Skills**



Although about 31.68 percent of the students **Learned** these skills **Equally In and Out of University**; 40.59 percent **Learned Out of University**, indicating that the engineering curriculum is not addressing these skills sufficiently. Only 26.20 percent of the sample **Learned In University**.

## ***6. Self Management***

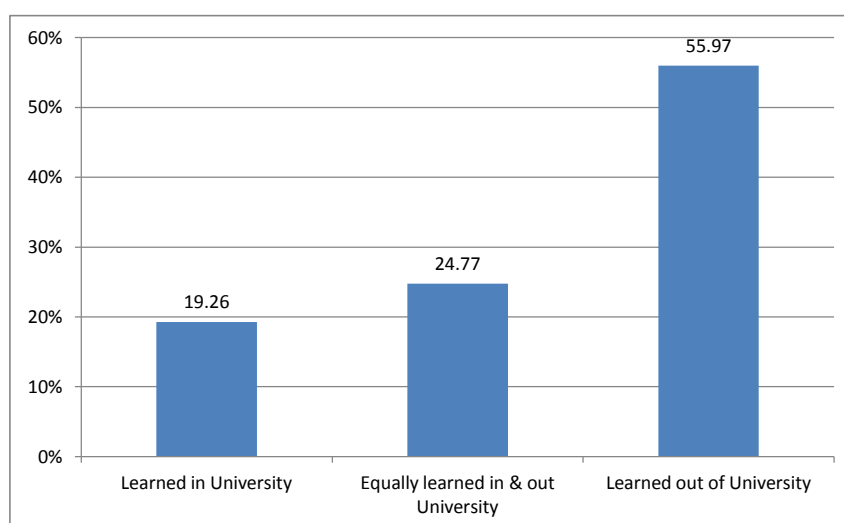
To study this skill we looked at the following questions:

(The student responds that he/she can)

1. Develop self-organizing strategies
2. Set priorities
3. Manage/oversee several tasks at once
4. Complete assigned tasks on time
5. Develop alternatives to meet objectives.

Figure 18 shows where students that had some competence in these skills had learned them.

**Figure 17 Where Students Learned Self Management Skills**



Nearly 56 percent of the students **Learned Out of University**; 24.77 percent **Learned Equally In and Out of University**; and only 19.26 percent **Learned In University**.

### ***7. Decision-making***

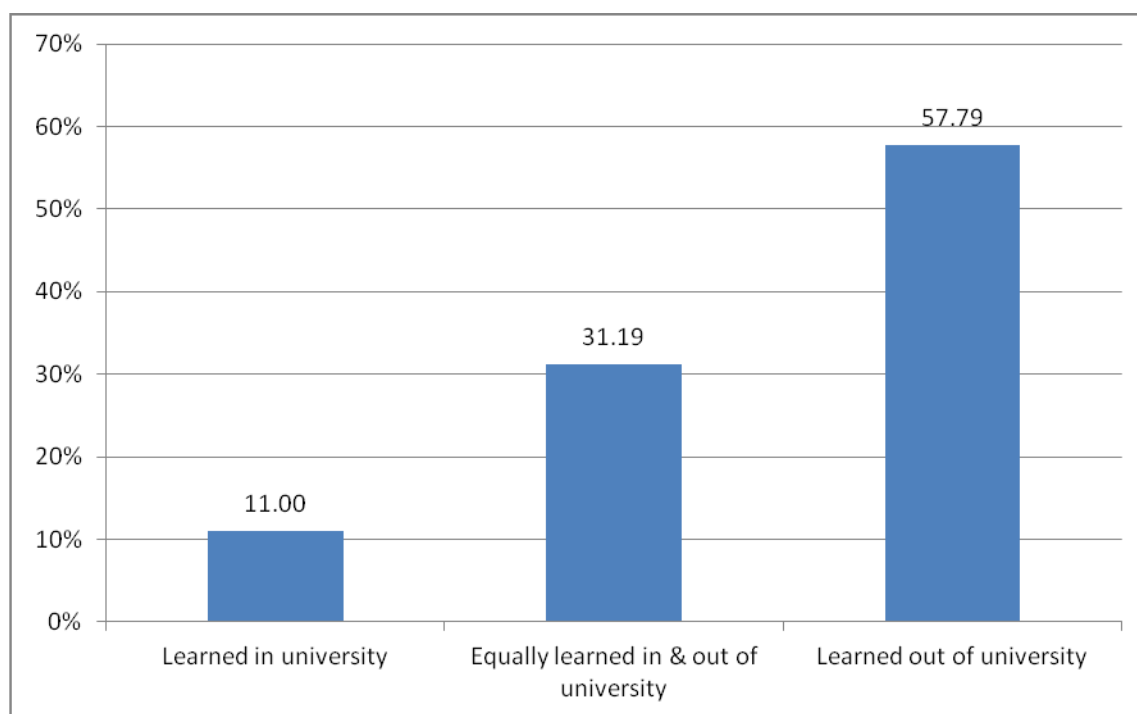
To study this skill we looked at the following questions:

(The student responds that he/she can)

1. Make decisions in a short time
2. Assess long-term effects of his/her decisions
3. Make decisions on the basis of analysis of the situation
4. Identify political implications of the decision
5. Analyze the effects of decisions making.

Figure 19 shows whether students who claimed to be competent in decision-making skills learned these skills at the university, in the outside world, or in some combination of the two.

**Figure 18 Where Students Learned Decision-making Skills**



When we asked the engineering students about the environment where they developed their decision-making skills, 57.79 percent said they learned those skill **Outside the University**. About 31.19 percent **Learned Equally In and Out of the University**. Only 11 percent **Learned Inside the University**. Again, this indicates that the curriculum has to be developed to include decision making skills.

### **8. Computer Skills**

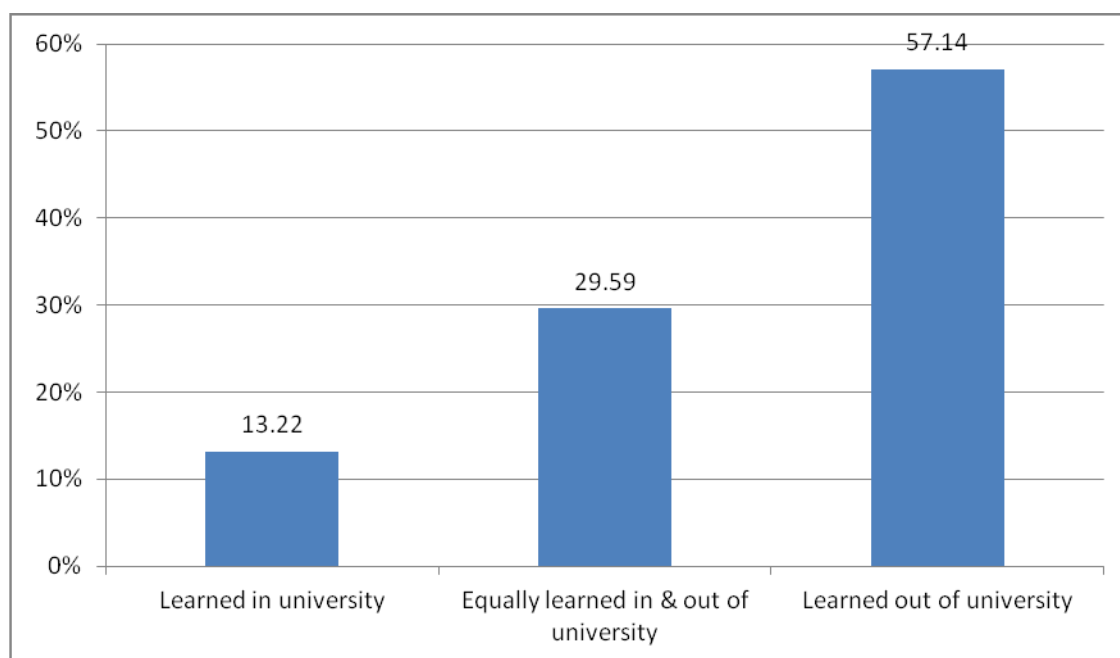
To study this skill we analysed the responses to these questions:

(The student responds that he/she can)

1. Surf the Internet to gather data for tasks
2. Use AutoCAD software effectively
3. Use technology to seek, process, and present class tasks
4. Can use different software applications to do class assignments
5. Is Able to design his/her own website.

Figure 20 shows whether students who expressed competency in using Computer Skills had learned within or outside the university, or in both.

**Figure 19    Where Students Learned to Use Computer Skills**



On questions about where engineering students learned and adopted technological skills, 57.14 percent of the students responded that their technological skills, including basic computer skills and the AutoCAD software, were **Learned Out of the University**; 29.59 percent said they had **Learned Equally In and Out of the University**; and only 13.22 percent said they had **Learned In the University**.

This indicates that the engineering curriculum is not offering these skills to the students, however strongly the job market is demanding them. The AutoCAD software is delivered to the university computer labs, but the students complained of not being taught how to use the software efficiently.

## CHAPTER FIVE

# *Conclusion, Implications & Recommendations*

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This study was divided into two stages: the first stage attempted to study the employability skills needed by the domestic market, how satisfied are the employers toward the graduate engineers performance in the workplace, and to describe the issues related to the disadvantages of not acquiring the employability skills. The second stage assessed whether the demanded skills are imbedded in the curriculum for undergraduate engineering at Ain Shams University, and to find the level of competence of engineering students to use those skills.

### **A. Goals of the First Stage**

- Identify the important employability skills needed by the domestic job market for engineers.
- Analyze of the employers' satisfaction toward the fresh graduate engineers' performance.
- Identify the issues related to the disadvantages of not acquiring those employability skills by the recruited employees, and its impact on the quality of their work.

## **Conclusions, Implications, and Recommendations**

### **1. Employability Skills Needed by the Domestic Job Market**

- **Ain Shams Engineering Graduates Need Additional Skills**—Respondents to the first stage of the study gave their opinions openly in the interviews. Most of the employers and human resources personnel were unsatisfied with the qualifications of the fresh engineering graduates and emphasized the importance of the skills needed by the domestic market. They pointed out that though currently the engineering students at Ain Shams University are considered the best qualified graduate engineers, their performance lacked important skills.

- **English and Computer Skills Most Wanted**—Employers and human resources personnel tend to have priorities among the different employability skills. Communication in English was most commonly mentioned, followed by the ability to use various technologies, especially AutoCAD software, used in various engineering tasks. In addition, employers are looking for higher thinking skills such as the ability to problem-solve, exhibit initiative and enterprise skills, and to plan and organize work.
- **High Economic Growth Requires Better Skills**—In conclusion, most of the interviewees insisted that to achieve high rates of economic growth in Egypt, the quality of engineering graduates' skills must be improved. The indicators of progress would be the skills that the engineering students should acquire during their learning process.
- **Employers Offer to Assist in Developing Curriculum**—Employers expressed willingness to be linked with the boards of universities, especially with the sectors responsible for planning the engineering curricula, in order to pursue their job market based vision for undergraduate engineers.

## 2. How satisfied are Employers with the Skills of New Engineering Graduates?

- **Domestic Employers are Not Satisfied**—Most of the employers and human resources personnel interviewed expressed some degree of dissatisfaction with the skills shown by new engineering graduates. There is no doubt that Egypt produces a large number of bright engineers who gain much needed skill within their first year of work experience in the field. This can be seen in the high tech and construction projects in Egypt, as well as from the international conferences and publications that comes from Egyptian engineering faculties on the national and international level. However, we need to keep in mind that employers have perhaps unrealistically high expectations regarding new engineers' employability skills.
- **Academic Weakness**—It does seem clear that the employers' level of dissatisfaction indicates that there are significant weaknesses in the academic process, especially within the engineering curriculum. Simply this curriculum does not include the



employability skills demanded by the domestic labor market. Therefore, new engineering graduates do not meet employer standards.

- **New Graduate Engineers Unable to Transfer Skills Learned to the Field—**Employers said that graduate engineers lack the ability to intelligently practice what they have learned in the classroom to the field of work. Thus, there is a real need to reform the education system. Employability skills should be embedded in the engineering curriculum and kept current. The interviewed employers expressed their willingness to work with universities to provide information about needed job skills for undergraduate engineers.

### 3. What are the Disadvantages of not acquiring the employability skills for Employers and New Graduates of engineering?

- **Inequitable Recruitment Policies—**Employers said they must recruit experienced engineers for certain jobs because jobs such as quality control and work planning require trained and skillful engineers. Newly graduated engineers are not considered for these posts due to the perception that they will not have the necessary skills. It is recommended that stakeholders develop policies for the recruitment process in order to have a fair and equal opportunity, based on qualifications, for all engineers.
- **Updated Engineering Curricula—**Some engineering specialities—fire protection and project planning, for example—have been standards in the market for nearly 20 years. No Egyptian faculty of engineering is offering a program for these fields. Thus it is recommended that the current domestic engineering job market be studied, and that educators make use of the information gathered to develop curricula and establish new equivalent departments in the faculties of engineering.
- **Reform Training Curricula—**there are few training centers in Egypt, and those that exist need help from the private sector to improve. Generally, these centers tailor courses to meet the needs of the companies that are their clients. Courses aim to enhance managerial skills, business communication, and computer and language skills. Unfortunately, they are rarely concerned with practical technical skills most in demand by Egyptian companies. Not only does the curriculum for university engineering education need reform, but the private training centers need support and reform to meet the market's needs.

## B. Goals of the Second Stage

- Describe the demographic characteristics of engineering students at Ain Shams University.
- Analyze the students self-perceived level of competence at performing employability skills.
- Identify the environment where the students develop their employability skills that are needed by the workplace.

## Conclusions, Implications, and Recommendations

### 1. Student Demographics

- **Student Data**—Males between 20–25 years of age represented 87.1 percent of the sample. The majority had a grade point average between “Good” (38.57 percent) and “Very Good” (32.86 percent). Most of the departments of the faculty were represented in the sample, which adds valuable points to the study. Although the students sampled were mostly men, with few women represented, that ratio holds true for the male/female ratio in the engineering faculty. This issue of male exceeding number than female in engineering might be studied separately in the future.
- **Previous Work Experience**—The average respondent had no previous work experience (61.4 percent) and 19.3 percent had less than 3 months of training work.

### 2. Student Perception of His/Her Own Competence

- **Students are Moderately Confident**—Overall, engineering students consider themselves to have a moderate degree of competence in most of the eight variables of the employability skills. It could be concluded that they are confident in their abilities related to employability skills although employers complain about the students' poor level of performance. It might be that the students are biased while answering the skills questions.
- **Graduates Seen by Employers to be Deficient in Higher Thinking and Problem Solving Skills**—Employer responses indicated that the engineering education system teaches students to memorize lessons rather than to perform in the field, especially in

the fields of higher thinking and problem solving the employers look for. Educators should consider that engineering firms increasingly require more creative and analytical engineers if industry and the economy is to improve sufficiently so that Egypt can compete in the global market.

- **Further Assessments and Studies Useful**—Future studies should assess the performance of the students in their field of study, especially focussing on the skills in which the students themselves believed they had little competence. Other effective studies might direct students in how to improve their employability skills through self learning.

### 3. Where Students Developed Employability Skills

- **University Curriculum Does Not Meet Real World Needs**—The students expressed their belief that the components of the engineering curriculum—classes, activities, and laboratory work—does not provide enough competencies to meet the real world. This study showed that the more the students believe they have high competence in the job market skills, the more likely it is that they developed it outside of the university. For instance, in measuring students perception about their competence of initiative and enterprise skills, 56 percent of students responded, “Yes, I have competence,” which is the highest scoring skill among the eight variables. Then, 55.4 percent of the responses about where those skills were learned said, “I learned it out of the university.” Again, this was one of the highest percentages among the measured variables.
- **Educators and Employers Must Develop a Relevant Engineering Curriculum**—University faculties and other education stakeholders should develop the engineering curriculum to improve the performance of students in using the skills identified in this study in their future careers. This requires a real sharing of ideas and benefits among employers within the private and public sectors to convey the market needs. There must be a match between what the job market demands and the qualification of the new graduates to develop our country.
- **Flexible and Creative Teaching Models**—University faculties should consider several ways to address students' knowledge and understanding of political and social implications as well as their intrapersonal and interpersonal human relations skills.

- **Incorporate Work Experience into the Curriculum**—Work experience helps the engineering students gain skills. Students should be encouraged by the system to gain work experience during years of university-level study. This could be followed through outline practicum courses in the engineering curriculum. It is mainly the Government's responsibility to improve the transition between schooling stages from secondary to higher education (Radwan, 2002). Curricula should include the skills demanded by the market to match the global development.
- **Mobilize the Labor Force through Effective Labor Policies**—Effective labor policies are needed for market development and to help mobilize the country's labor force, university graduates, secondary school leavers, and drop outs. Real reform is necessary to direct the curriculum to satisfy market needs, serving both employees and employers who are rebuilding society.

### C. Final Recommendations

- More researches should be conducted to link the benefits of work experience, courses, and activities that contribute to the development of employability and technical skills to the curriculum.
- The need of the job market should be analysed and updated constantly to cover all aspects and skills needed by the work place—not only for engineers but also for graduates of other faculties in the Egyptian universities. This will surely aid Egypt's development process on the national and international levels.
- A study should be conducted to correlate the students' level of competence and job performance on a wide scale. This could be used as a tool to guide curriculum planners and faculties in deciding which courses match the needs of the domestic and international market.
- More Training Centers are recommended—some employers said that training after graduation is necessary in order to have qualified employees. New university Graduate is not acquiring sufficient skills to be recruited directly. Therefore training is important even after recruitment to keep abreast of developments in the market—it is crucial for an employee's career development as well as for the benefit of the

employer's jobs. Thus, more training centers administered by both the government and the private sector to improve engineers' skills and performance is recommended.

- A future study suggested for assessing the reasons why there are exceeding numbers of male than female in engineering. Perhaps engineering graduates exhibited a different level of excellence in the needed employability skills by the domestic market.

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# Appendix I

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## **Egyptian Engineers Generic Employability Skills Questionnaire**

**For Undergraduate & Graduate Students,  
Faculty of Engineering, Ain Shams University**

**May, 2011**

Thank you for your willingness to answer this questionnaire, which focuses on your learning skills which you obtained in your university. I would like to introduce myself first, and then mention my purpose for such questionnaire. "The information you and other undergraduate and graduate students are providing me will be reported in a study that will be available to the American university in Cairo. The primary goal of the study is to know the nature of the skills you learn in your faculty and if it is proper to your future career. For the purpose of this questionnaire, your response will be a basic data collection which will help in improving the quality of skills learned in the Egyptian universities. Your answers are confidential and neither the university staff nor any member will be able to identify you. The questionnaire has a guide and an example at the top of part II. Please take 5 minutes to read ahead. The whole questionnaire should take you approximately 20 minutes. I appreciate your time and valuable inputs, if you have any questions or concerns, please state your comment at the end of the questionnaire.

### **PART I – Personal INFORMATION**

**Please fill in the blank unless directed otherwise.**

1. How old are you? \_\_\_\_\_
2. What is your sex? (Circle one) MALE FEMALE
3. Do you have work experience before (Circle one) YES NO
4. How many total MONTHS of work experience do you have? \_\_\_\_\_
5. i. What is your current year of study (circle one),
  - A. Freshman (circle one) Year one Year two
  - B. Sophomore
  - C. Junior
  - D. Senior

ii. Write the name of your Department in the faculty .....

6. What is your grade last year? (circle one)

A. Excellent    B. Very Good    C. Good    D. Pass    E. Poor

## PART II – EMPLOYABILITY SKILLS ASSESSMENT

Please provide two responses for each of the employability skills listed below by circling one response in each of the two columns.

### SAMPLE QUESTION:

item  Circle your response	Grade your ability to perform The employability skill					Environment where You developed the employability skill				
	Very Minor competence	Minor Competence	Moderate Competence	High competence	Very high competence	Almost learned in university	Mostly learned in university	Equally learned in & out of university	Mostly learned out of university	Almost exclusively learned in & out of university.
#. Facilitating a panel discussion	1	2	③	4	5	1	2	③	4	5

On the item above, the student perceived him/herself to have moderate competence in facilitating a Panel discussion and that he/she developed that competence equally in university and out of university (May be in work or training ).

**Please circle your answer in the two following columns:**

<div>item</div> <div>Circle your response</div>	Grade your ability to perform the employability skill					Environment where You developed the employability skill				
	Very Minor competence	Minor Competence	Moderate Competence	High competence	Very high competence	Almost learned in university	Mostly learned in university	Equally learned in & out of university	Mostly learned out of university	Almost exclusively learned out of university
1.Make effective presentation to my professor & colleagues	1	2	3	4	5	1	2	3	4	5
2.Convey information one to one	1	2	3	4	5	1	2	3	4	5
3.Write research papers, memos, reports in English	1	2	3	4	5	1	2	3	4	5
4.Use proper grammar, spelling, & punctuation	1	2	3	4	5	1	2	3	4	5
5.Listen attentively to others	1	2	3	4	5	1	2	3	4	5
6.Use to do assignment projects alone	1	2	3	4	5	1	2	3	4	5
7.Use to do tasks with peers,& groups	1	2	3	4	5	1	2	3	4	5
8.Set rules of engagement among assignment team	1	2	3	4	5	1	2	3	4	5
9.Play several roles in the team work	1	2	3	4	5	1	2	3	4	5
10.Transfer effectively between individual and team assignments	1	2	3	4	5	1	2	3	4	5
11.Identify problems	1	2	3	4	5	1	2	3	4	5
12.Identify essential components of the problem	1	2	3	4	5	1	2	3	4	5
13.Show independence in solving problems	1	2	3	4	5	1	2	3	4	5
14.Sort out the relevant data to solve the problem	1	2	3	4	5	1	2	3	4	5
15.Use various problem techniques and tools	1	2	3	4	5	1	2	3	4	5
16.Use brainstorming activities effectively	1	2	3	4	5	1	2	3	4	5
17.Analyze information from different resources	1	2	3	4	5	1	2	3	4	5
18.Apply information to new context	1	2	3	4	5	1	2	3	4	5

<p>item</p> <p>Circle your response</p>	Grade your ability to perform the employability skill					Environment where You developed the employability skill				
	Very Minor competence	Minor Competence	Moderate Competence	High competence	Very high competence	Almost learned in university	Mostly learned in university	Equally learned in & out of university	Mostly learned out of university	Almost exclusively learned out of university
19.Initiate change activity within the learning process	1	2	3	4	5	1	2	3	4	5
20.Design innovative tools for class work	1	2	3	4	5	1	2	3	4	5
21.Do research and data collection	1	2	3	4	5	1	2	3	4	5
22.Develop action plans for project assigned by the professor	1	2	3	4	5	1	2	3	4	5
23.Plan and organize events & activities	1	2	3	4	5	1	2	3	4	5
24.Establish clear project goals & deliverables	1	2	3	4	5	1	2	3	4	5
25.Set strategies for doing tasks	1	2	3	4	5	1	2	3	4	5
26.Have self organizing strategies	1	2	3	4	5	1	2	3	4	5
27.Set priorities	1	2	3	4	5	1	2	3	4	5
28.Manage/oversee several tasks at once	1	2	3	4	5	1	2	3	4	5
29.Punctual in doing the assignment tasks	1	2	3	4	5	1	2	3	4	5
30.Estimate alternative ways in meeting objectives	1	2	3	4	5	1	2	3	4	5
31.Make decisions in a short time period	1	2	3	4	5	1	2	3	4	5
32.Assess long term effects of your decisions	1	2	3	4	5	1	2	3	4	5
33.Make decisions on the basis of analyzing the situation	1	2	3	4	5	1	2	3	4	5
34.Identify political implications of the decision to be made	1	2	3	4	5	1	2	3	4	5
35.Analyze the effects of decisions made	1	2	3	4	5	1	2	3	4	5
36.Surf the net to gather data for different class tasks	1	2	3	4	5	1	2	3	4	5
37.Use AutoCAD software effectively	1	2	3	4	5	1	2	3	4	5

item  Circle your response	Grade your ability to perform the employability skill					Environment where You developed the employability skill				
	Very Minor competence	Minor Competence	Moderate Competence	High competence	Very high competence	Almost learned in university	Mostly learned in university	Equally learned in & out of university	Mostly learned out of university	Almost exclusively learned out of university
38.Use technology to seek, process and present class tasks	1	2	3	4	5	1	2	3	4	5
39.Able to use different office applications to do class assignments	1	2	3	4	5	1	2	3	4	5
40.Able to design your own website	1	2	3	4	5	1	2	3	4	5

Comments: .....

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**THANK YOU!**  
**WE APPRECIATE YOUR PARTICIPATION**

## *Appendix II*

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### **INTERVIEW SCHEDULE: for Employers & Human Resource Personnel** **The interview questions on the skills needed by the job market**

**Draft issued - October-2010**

Thank you for your willingness to answer these interview questions, which focus on your experience as employers and human resource personnel. I would like to introduce myself first, then mention my purpose for such an interview" the information you provide me will be reported in a study that will be available to the American university. The primary goal of the study is to know the nature of the skills you need in the work place from the engineers you recruit this year. For the purpose of this interview, your answers will be a basic data collection which will help in improving the quality of skills learned in the Egyptian universities. Your answers will remain confidential. The interview should take you approximately 30 minutes. I appreciate your time and valuable inputs, if you have any questions or concerns, please state".

#### **The interview questions:**

1. Do you follow certain system to recruit engineers in your work place? If yes. Please mention the steps you follow
2. Do you use El-Ahram newspaper to advertise about vacancies in your workplace? If yes. How often do you have advertisements this year 2010/2011 for engineers?
3. If not? How do you advertise about vacancies? Please state the agencies name or the system
4. What skills do you ask for in the advertisements? Please mention them
5. In addition to educational and professional experiences you seek for employing engineers, what else would you like to know about them in order to make an appropriate decision?
6. Do all vacancies which are advertised by you, filled on time or not? If not. please state the cases
7. Why do you ask for such skills? Do you really need them all in your workplace
8. Do the fresh recruitments work directly or they have to be trained for a time?

9. How long they stay in training, before actually work? Why?
10. Is English language needed by engineering practitioners in your workplace? If Yes, why?  
If No, why not?
11. Are there any measures to improve English language ability of engineering practitioners here? If yes, what are they?
12. How often do you do business with international engineering practitioners? In doing that, is English language the essential means in communication?
13. Do you find any limitations from the language proficiency for your engineers? Would measure it fair, good, very good, excellent. If yes mention examples
14. Are there any advantages and disadvantages emerged from this measures to employ new employees? If yes, what are they?
15. Do you plan to solve these difficulties? If yes, how?
16. To eliminate those limitations for the future engineers in work field, please recommend, in your opinion the most essential and urgent aspects of English language proficiency for further development?
17. Would you please state the same conditions for using computer, and if there is special software the employees should learn in school. Ex AutoCAD
18. Why it is essential for engineers to use such software in the work place?
19. According to your experience with fresh graduates, how do you evaluate the level of the fresh graduate engineer in using it?  
  
☐ Poor    ☐ Fair    ☐ Good    ☐ very Good    ☐ Excellent
20. In your opinion, why management skills are important for engineers?
21. Do you think they should learn them in university? Why?
22. Do you need your employees to work in groups, if yes? Mention the difficulties they face to work in groups? Why?
23. What qualities should a successful manager/leader/supervisor/etc. possess?
24. Please state an example of problem solving, one of your recruited engineers did in the past. Why do you think it is essential to learn this process at school?
25. Do you need creative engineers, why? And how do you think they should learn to be creative thinker?
26. How often do you do an international business? Per month

27. What kind of communication skills do you need from your employees to be well acquired? What is the right channel to gain such skills? Do you train them?
28. How often do fresh graduate engineer write reports, emails, letters and present work in a meetings per week? Are they doing that efficiently? If no? Why?
29. To eliminate those limitations for the future engineers who should be appropriately equipped for the global and national business, please recommend, in your opinion, the most essential and urgent aspects of teaching them those skills for further development?
30. Would you like to add anymore comments?

**Thanks for your participation in this interview**