

ASSESSMENT OF THE PRACTICAL TRAINING REQUIREMENT IN ENGINEERING EDUCATION IN PALESTINIAN UNIVERSITIES

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ABSTRACT: Practical internship is a mandatory course requirement in all Engineering undergraduate programs in all Engineering disciplines and in all Palestinian universities and is congruent with international norms. In such courses, students are expected to spend a period of eight to ten weeks in a recognized engineering firm in order to achieve essential hands-on skills in their respective fields of study. Upon completion of this requirement students are required to present a comprehensive report detailing the extent of the practical experience attained in design work or in the field. Vernacular reasons dictate that the bulk of Palestinian students implement this requirement in local engineering firms. The following study is conducted to scrutinize the relevance of this requirement in fulfilling the objective of the requirement under the prevailing conditions of limited adequate engineering facilities taking into serious consideration the perpetually growing student demand.

The following study shows that, despite the importance of this course as a key requirement for producing well qualified and trained engineering graduates, the actual practice of implementation needs to be constantly scrutinized. The hurdles facing better reinforcement of this obligatory requirement are discussed and suggested solutions are subsequently recommended. The study concludes that unless the training period is invested at a venue providing trainees with adequate exposure to the cutting edge of technology and to state of the art engineering then

the entire exercise would be one of futility as it would be counter productive. The present experience of the ubiquitous students exchange program for the purpose of training through the Union Arab Universities or through the International Association for the Exchange of Students for Technical Experience (IAESTE) is thoroughly discussed. In the Palestinian context transfer of knowledge is a well desired prerogative in the long overdue state building endeavor.

INTRODUCTION

Engineering education in Palestinian universities is playing a substantial role in fulfilling the dire need for skilled and well-trained engineers highly required to meet the intensified development and reconstruction efforts especially in infrastructure, construction and industry sectors which are corner stones in the state building enterprise.

The initiation of engineering education in the Palestinian Territories happened in 1978 by the simultaneous establishment of 5 engineering departments in the West Bank; two of which are at An-Najah National University and the other three at Bir Zeit University. Presently there are 33 engineering undergraduate programs in 7 universities among the 13 universities that are spread in the West Bank and the Gaza Strip. The Ministry of Education and Higher Education regulates and monitors the quality of education in these universities through the newly established Accreditation and Quality Assurance Council (AQAC).

The total area of the Palestinian Territories [the West Bank and Gaza Strip combined] is 5950 square kilometers, with a population that exceed four million in 2010. The number of registered engineers in the Palestinian Territories climbed to a whopping 14,000 in the year 2010. The number of engineering graduates from Palestinian universities increased from around 250 graduates in 1999 to more than 1500 graduates in 2009. The colleges of engineering in Palestinian universities award a B.Sc. degree in 12 different disciplines. All local universities follow the semester model, where the students in general are required to complete 160 to 175 credit hours for graduation, which extend over a five year period. Practical internship is a mandatory course requirement in any engineering undergraduate program in all Palestinian universities. This course is a zero credit course in most of these programs. However in some of the programs the course carries 3 to 6 credit hours. In such courses students are expected to spend a period of 6 to 8 weeks in a recognized engineering firm in order to achieve essential hands-on skills in their respective fields of study in order to meet ABET requirements. The Engineering Accreditation Commission, ABET, requires that engineering programs must demonstrate that their students have attained the following outcome:

1. A recognition of the need for, and an ability to engage in life long learning
2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

RESEARCH METHODOLOGY

For the assessment of the effect of the practical training internship course in the engineering programs in the Palestinian universities, a special questionnaire was designed to explore the opinions of a sample of students at the fourth or the fifth year level and who completed the internship course requirement.

The questionnaire was designed to include a general information section, followed by a section in which the student was requested to mark a grade on a scale of 1 to 10 expressing the extent to which the internship course met expectations regarding the following aspects:

1. Supplementary knowledge.
2. Preparation for the first job.
3. Technical writing.
4. Administrative skills.
5. Detailed drawing.
6. Motivation for starting a private interpreneurship.
7. Computer skills.
8. Familiarity with used codes .
9. Development of interpersonal skills
10. Building analytical capacity.

A sample of 250 students covered the universities in West Bank only, because students in the Islamic University in Gaza did not have the chance to be practically trained as required for the last three years because of the siege of Gaza Strip and due to the lack of training opportunities. The internship course was implemented in an extra ordinary form. The sample covered all engineering disciplines in the Palestinian universities. The supervisors who administer the implementation of the internship course in the schools of engineering were interviewed in order to examine their position regarding the current practice and their evaluation of the obstacles limiting the reaping of the potential benefits of the internship course.

STATUS OF PRACTICAL TRAINING IN THE PALESTINIAN UNIVERSITIES

The Engineering study programs in the Palestinian universities are essentially not diverse. They generally tend to prepare their students for local engineering vernacular practice which magnanimously speaking leaves a lot to be desired. Although the programs are not identical, they emanate from the same guiding principles. Research versatilities are absent due to obvious reasons that include but are not limited to lack of resources, financial and otherwise. Attracting seasoned faculty members is a futile exercise under the prevailing faculty benefit packages. Most serving faculty members are a product of a self-sustaining faculty creation program which is self-limiting when the objective is to create a remarkable academic climate conducive to being at the cutting edge and able to match other regional academic institutions of excellence.

Bir Zeit University has five undergraduate programs which essentially require 160 credit hours for graduation. The six-week internship, although obligatory, does not carry any credit hours. At Al-Quds University this graduation requirement is nearly the same save for the duration which is quoted in work hours rather than in weeks. At An-Najah University which has the largest engineering student population with 10 undergraduate engineering programs, students are required to complete 165 credit hours for graduation. The internship requirement carries three credit hours and spans an eight week period in a recognized engineering firm.

In the Islamic University of Gaza the total credit requirement for the first engineering degree stands at about 170. Internship is obligatory but carries no credit hours save for the Architectural study program where the credit number for the internship is two. The rest of the Palestinian Universities follow an almost identical course in defining the internship requirement. Table 1 provides a summary of the internship requirement in the various Palestinian universities.

Table 1: The Internship Course Requirements in The Palestinian Universities

University	Department	Total	Internship course	Cred	Period
An -Najah National University	Civil Eng	166	61391	3	8 wks
	Architectural Eng	170	62400	3	8 wks
	Electrical Eng	165	63460	3	8 wks
	Chemical Eng	164	64390	3	8 wks
	Industrial Eng	163	65590	3	8 wks
	Computer Eng	173	66304	3	8 wks
	Mechanical Eng	160	67400	3	8 wks
	Building Eng	166	68400	3	8 wks
	Mechatronics Eng	163	67484	3	8 wks
	Communication Eng	165	69404	3	8 wks
Bir Zeit University	Mechatronics Eng	160	ENMC 401	0	6 wks
	Electrical Eng	160	ENEE 401	0	6 wks
	Civil Eng	160	ENCE 401	0	6 wks
	Architectural Eng	164	ENAR 401	0	6 wks
	Mechanical Eng	160	ENME 401	0	6 wks
The Arab American Islamic University Gaza	Telecom Eng	163	11071431	6	3 months
	Civil Eng	172	ECIV 4000	0	8 wks
	Architectural Eng	174	EARC 4216	2	
	Electrical Eng	170	EELE 4000	0	60 hrs
	Computer Eng	170	ECOM 5000	0	60 hrs
	Industrial Eng	172	EIND 4000	0	60 hrs
Palestine Polytechnic Polytechnic University	Mechanical Eng	163	ME391+ME491	0	180+180
	Civil & Building	163	CE 391+CE 491	0	180+180
	Electrical Computer	163	EE391+EE491	0	180+180
Palestine Technical University	Electrical Eng	170	No Course	0	400 hrs
	Industrial Eng Automation	163	No Course	0	8 wks
	Computer Eng	164	No Course	0	8 wks
	Mechatronics Eng	163	No Course	0	8 wks
	Communication Eng &	164	No Course	0	8 wks
AL-Quds University	Electronic Eng	162	No Course	0	120 hrs
	Computer Eng	166	No Course	0	120 hrs
	Materials Eng	163	No Course	0	120 hrs

Analysis of Results:

The student responses are presented in bar charts shown in the figures below. The graphs represent the degree of student satisfaction in regard to the training experience they had while striving to satisfy an important university graduation requirement.

Before in depth scrutiny of the results portrayed in the bar charts it is worth keeping in perspective the fact that students by and large have no established datum to compare their training exercise with. The choices made in the questionnaire were perhaps whimsical par excellence and based on little or no solid rational. Figure 1 indicates that trainees by and large expressed satisfaction. In Figure 2 the degree of satisfaction in the various disciplines is presented. While most disciplines hover around the 5.5 mark, the development of interpersonal skills stood out on the positive side while drafting engineering details stood out on the negative side. This is quite understandable; students are having their initial exposure to the business world with whatever degree of excitement this entails while on the other hand they do not get much exposure to hands-on production experience. At An-Najah University students, Figure 4, point negatively to technical writing. This is perhaps linked to the prevalent moderate English language skills. Furthermore, this may point towards the general abilities of the training venues in the general vicinity of the Palestinian Territories. This conclusion gets yet further reinforced when compared to the similar results of Bir Zeit University and Palestine Technical University (Khadoury). At the Palestine Polytechnic University in Hebron, students were clearly dissatisfied with the computer skills they expected to acquire during their training exercise, Figure 6. Regarding the types of firms that provided training opportunities, Figure 9 shows that such opportunities were uniformly distributed among all potential training providers; nongovernment organizations having a slight edge. On the other hand Figure 8 shows that a small fraction of engineering students invested time in a factory setting. This is expected as the Palestinian Territories are not known for their industrial capabilities. This area is best described as a market for the region. For obvious reasons the Israeli products overwhelm the Palestinian market.

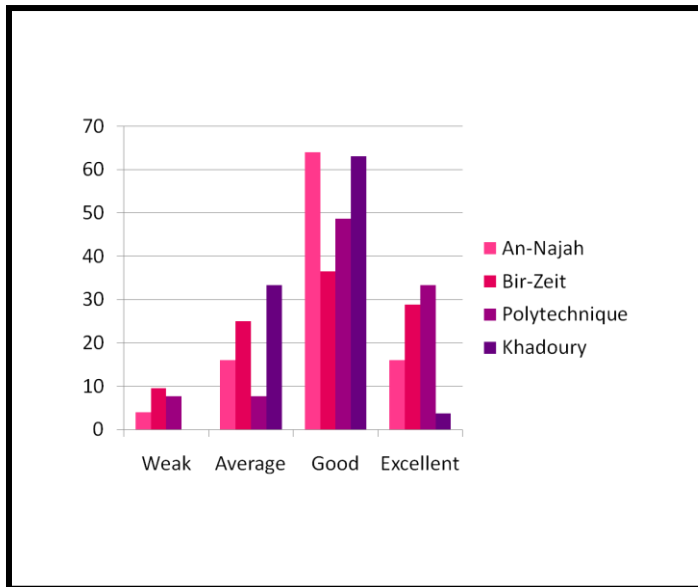


Figure 1: General Evaluation of Students in The Palestinian Universities For Internship Course

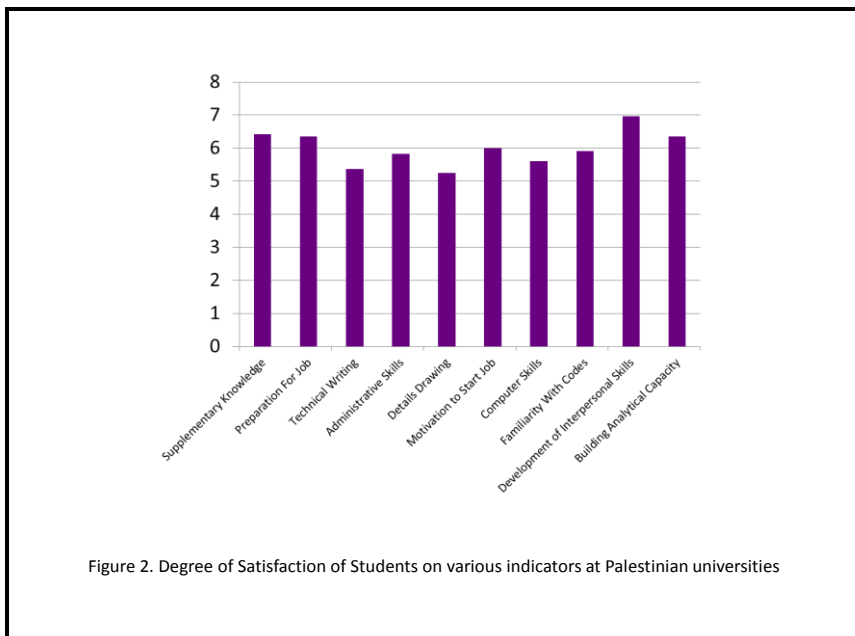


Figure 2. Degree of Satisfaction of Students on various indicators at Palestinian universities

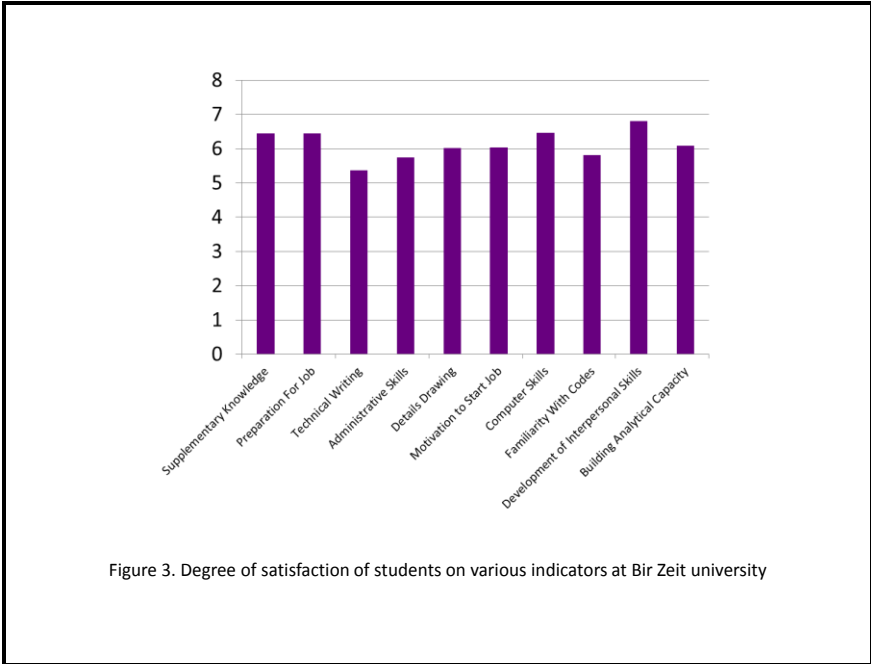


Figure 3. Degree of satisfaction of students on various indicators at Bir Zeit university

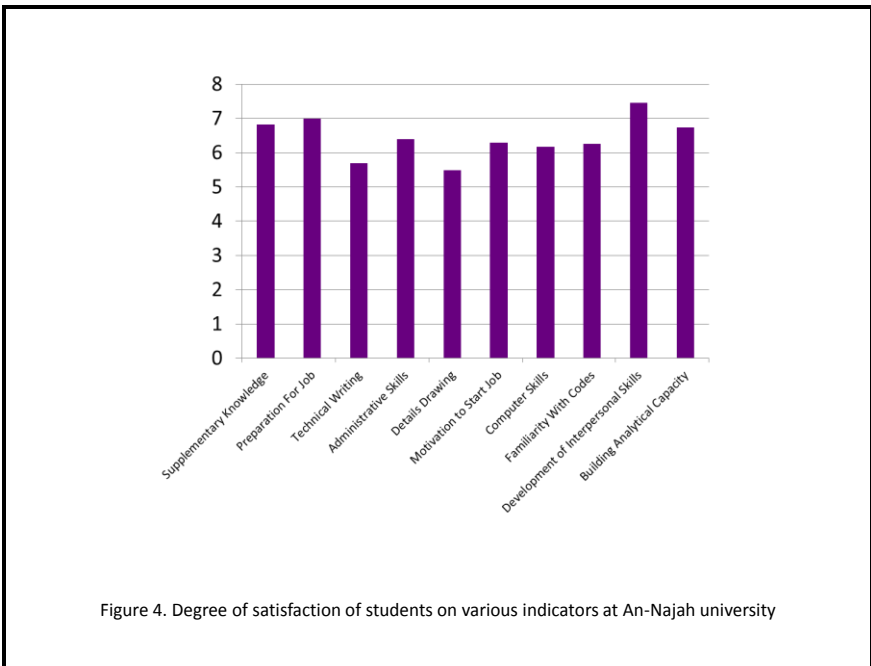
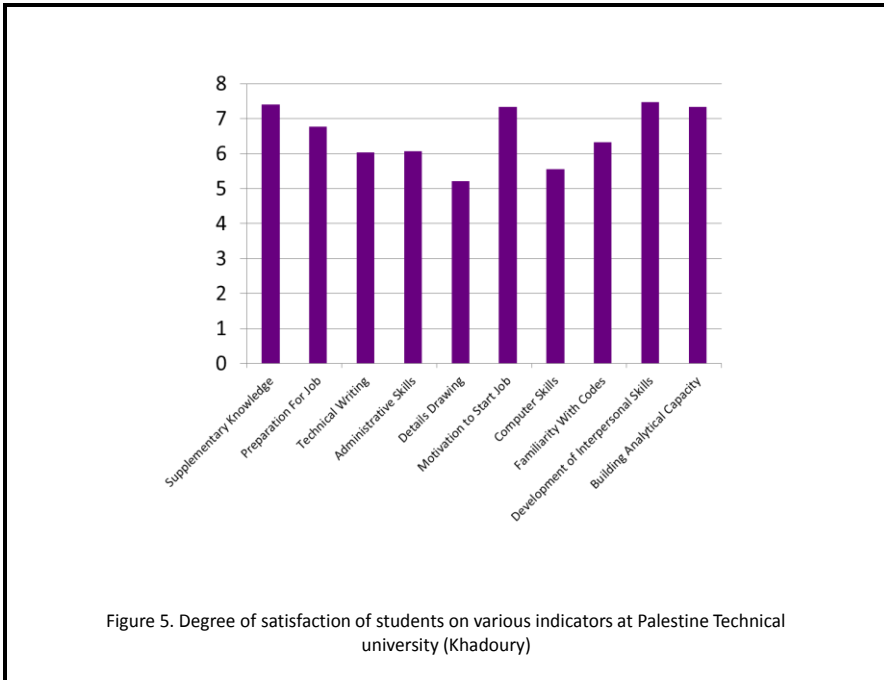
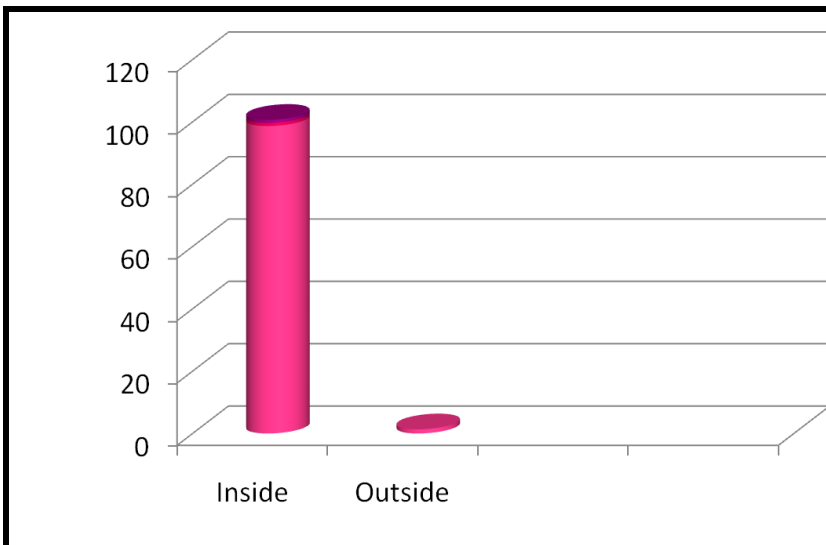
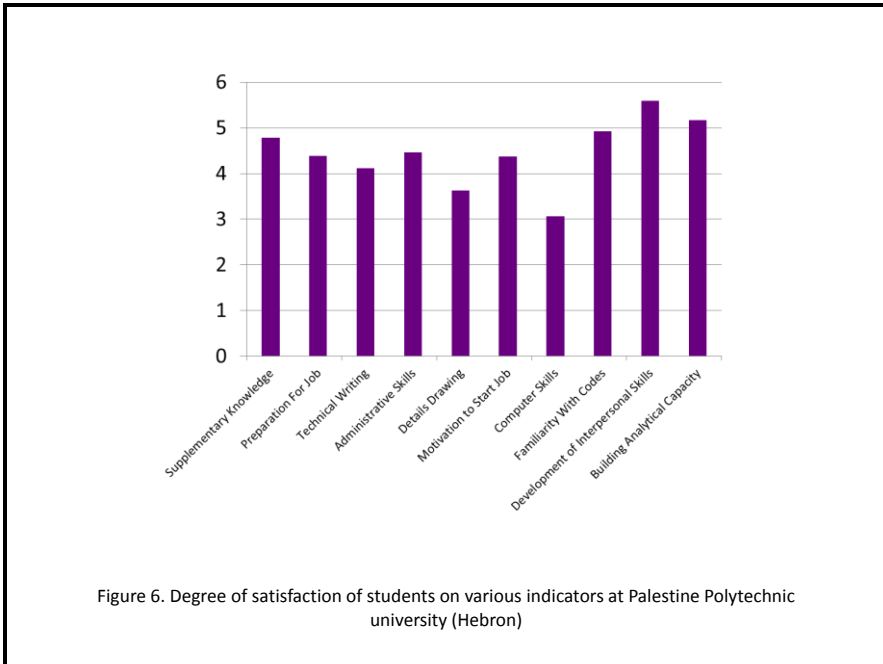


Figure 4. Degree of satisfaction of students on various indicators at An-Najah university





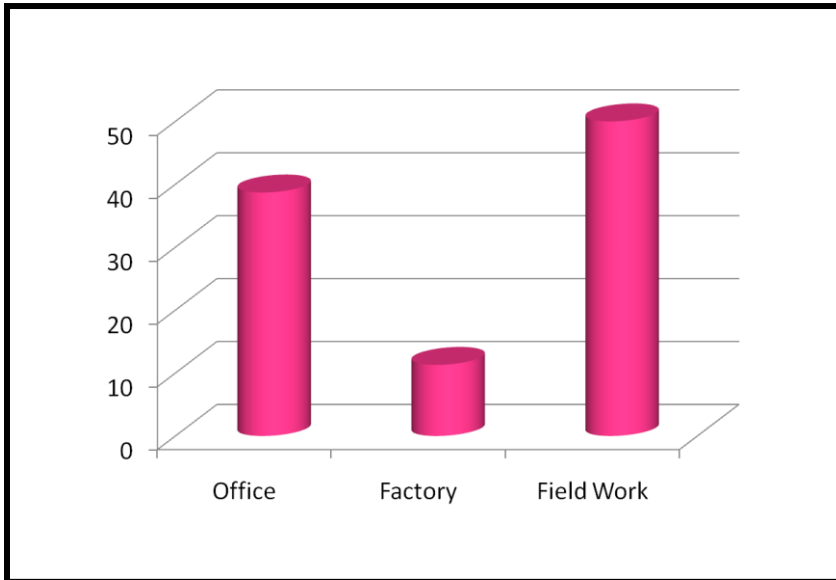


Figure 8. Percentage of Distribution of Training Period Among Different Fields

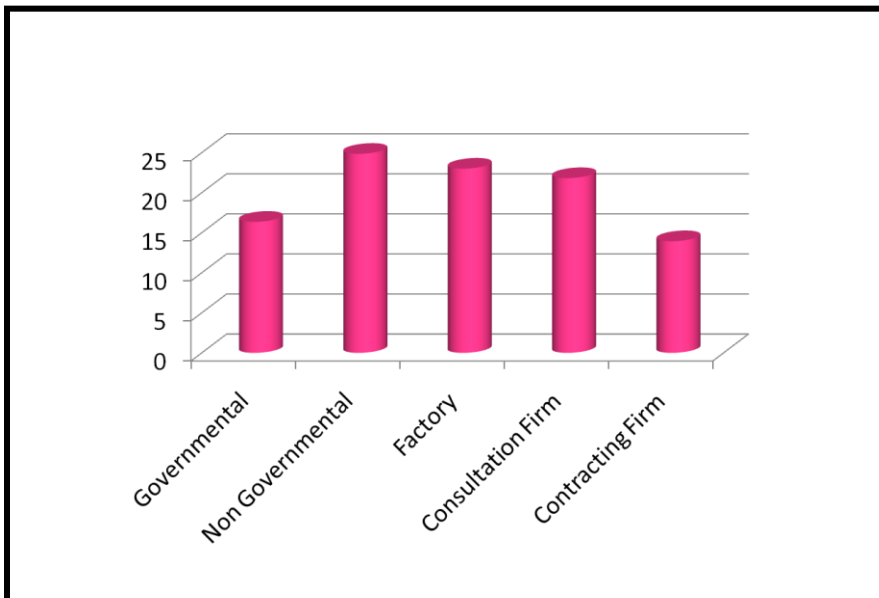


Figure 9: Percentage of Distribution of Internship in Different Types of Business

CONCLUSION

The Palestinian Territories are on the path of becoming an independent state and under such conditions technical expertise that matches international standards is the order of the day. The extremely rapid development of technology is an added dimension that must be kept in perspective. Local technical training is no more than a rehash of an already expired technology. It fails to bring into the country a seriously needed added knowledge. The local market is just a reflection of the prevailing technical experience. Beyond any shadow of doubt, local training does not contribute effectively towards widening the horizon of the young university graduates and, as such, it does not help expand the local industry sector capabilities. In this direction the local industry needs to import and indigenize state –of-the-art technical knowledge. Student training is one effective mechanism in the dynamics of technical experience exchange. In the discourse one should not fail to clearly note that future leadership is what is at stake. The results of the questionnaire by and large show a seemingly satisfying outcome. However it is not to be taken for granted as none of the students marked his or her choice according to any established criteria. The measured student satisfaction in this case is more of a concern than a comforting outcome.

International training possibilities through IAESTE are up for grabs. The onus for directing senior students towards such potential training venues rests squarely upon the local administrative body of the Palestinian universities at all levels with particular emphasis on the local engineering schools' administration. Perhaps an ad hoc financial aid program for student support may be solicited. It is of paramount importance to accept the fact that study programs remain self-limiting unless they bring the student populace towards exposure to the real world of technology. To perpetually rely on text book type problems and solutions is self-defeating; it is a recipe for losing a sense of direction.

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