

Survey Among Female Engineering Students From The University Of Bologna¹.

General Objectives.

It has been demonstrated that the contribution of women to improve the scientific-engineering workplace is relevant, so it is certainly necessary to increase their presence in this field. This can be done by revising the teaching methods, removing the obstacles that women come across in the world of work and supporting their careers in entrepreneurship.

The main aim of this survey is to understand how to stimulate women of scientific faculties to found their own company. In more detail, we want to identify what is the women's perspective with reference to: what is important in choosing a future career; which characteristics are necessary to possess to undertake this type of activity; which difficulties, would they meet to accomplish it and which initiatives could universities use in order to encourage them to consider this type of professional field. To answer these questions, a survey has been carried out among girls at the Faculty of Engineering at the University of Bologna.

Girls Interviewed

33 girls in total were interviewed from the Faculty of Engineering who are studying degrees in Engineering Management (E&M) and Mechanical Engineering (McE).

The campaign was intended for female undergraduates at the point of graduating therefore they have probably already thought of their future prospects and selected the various alternatives that they could take up.

Even though these women are from the same faculty (Engineering), the Management and the Mechanical ones showed a different inclination towards a company based profession: in fact, the girls of Engineering Management are more inclined to this type of field, whereas those of Mechanical Engineering seem not to have a clear idea about it.

There is a diversity at the base of the degree choices: for example, those from Mechanical Engineering are very rational, ready to confront also radical changes, that don't rank the founding of one's own company highly (some have never thought about it) and that don't consider themselves adequate for this type of field, due to little knowledge of the skills necessary; while the girls of Engineering Management are more likely to have taken in to account the idea of founding their own company.

Analysing The Results

The girls were asked to specify the motives for which they chose their degree and, in their opinion, which characteristics and aspects are important in choosing their future career. And also, whether founding their own company was part of their plan and which initiatives could the University undertake to stimulate more students to take into consideration this type of field.

The results that emerged are different between the two sets of interviewees.

¹ English summary by Laura Del Vescovo and Miretta Giacometti from the dissertation of Laura De Santis "Women, engineering and entrepreneurship" available in full text in Italian

While the girls from Engineering Management have clearly highlighted that one of the principle motivations for choosing the degree is future career possibilities, the girls from Mechanical Engineering are more motivated by the subjects featured on the course and scientific syllabus and only in second place do they consider their future career prospects.

Regarding the important attributes in determining their future career, (as illustrated in graphs 1 and 2 for E&M and McE respectively) the female students of Engineering Management have given importance to 'the coherence between their university education and future careers' which is not the case for the female students of mechanical engineering. For the latter, it seems that they are more flexible to adapt to the different career branches that they are offered, giving value to their studies as personal satisfaction.

With reference to the importance of 'space for creativity', one can note that among the E&M students there does not exist a predominant tendency or it is not considered essential. From the group of McE, creativity is thought to be less essential than among the girls of E&M, perhaps due to the schematic models that one has to stick to for the degree course.

'Human relations and good working environment' are considered very important by both the two group. Also, 'the recognition of one's own capabilities' is firmly taken into consideration by both groups, proving useful to continually motivate oneself.

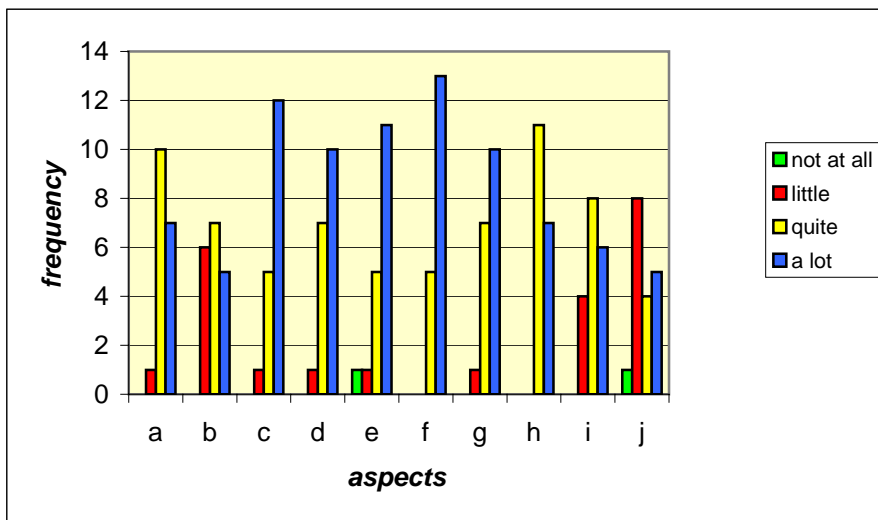
Regarding 'the compatibility of work with private life', it is given great importance among girls of E&M, apart from rare cases when they do not consider it to be an important element when choosing their future career. The girls from McE, however, believe that combining work and private life is not a fundamental aspect. Obviously, however, it is important that the future job offers the possibility to have a good career. So the last aspect is important for the girls from McE, in measure still greater than for those from E&M.

'Job security' nowadays is an aspect that is very fleeting with regards to long term contracts. Perhaps this is the consequence of the fact that our generation grew up with parents in permanent employment and so the idea of a temporary job has not yet been accepted. In the case of the girls of McE, security and continuity of employment are considered to be important but not excessively, confirming the flexibility of these students, as previously demonstrated, they put personal satisfaction of their studies before their potential wage. For the girls of E&M: income is important, but not predominant.

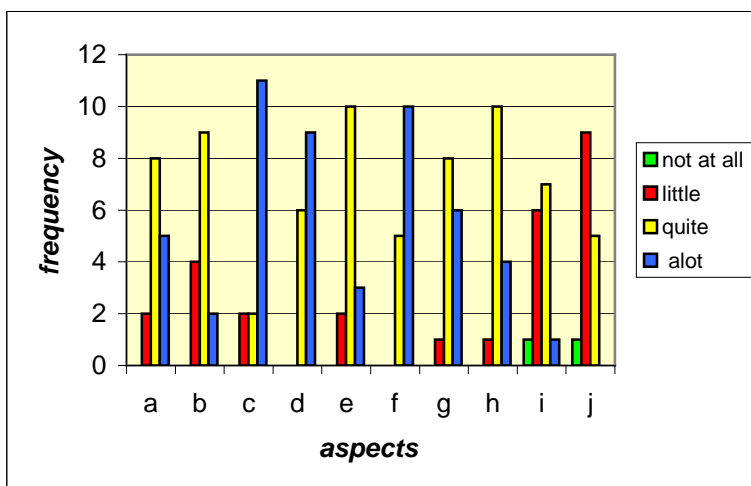
Regarding 'flexibility of time', it is viewed by the girls of E&M to be quite important, however this aspect is of little importance by the girls of McE.

'The possibility to be a leader' is not really at the centre of the interests of the girls from E&M; however in some cases it is taken into consideration. In the branch of McE, instead, such possibility is decisively considered little.

Graph 1: Important aspects in determining career choice. (E&M)



Graph 2: Important aspects in determining career choice (McE)



Key for graphs 1 and 2

- a. coherence of university education with work
- b. space for creativity
- c. good work environment and human relations
- d. acknowledgement of one's own capabilities
- e. compatibility with private life
- f. future prospects
- g. security and continuity
- h. wage
- i. time flexibility
- j. possibility of being a leader

Aspects that can help or hinder the career progression are considered from Graphs 3 to 6.

It emerges that the 'passion for what one does' is considered a very important factor for most of the girls of E&M and definitely important for almost all the McE sample.

For career progression, the girls of E&M believe that constant commitment is necessary, which is linked to the 'capacity to cope with hard work'. This opinion is also shared with the girls of McE regarding constant involvement while the ability to adapt to hard work is considered less important.

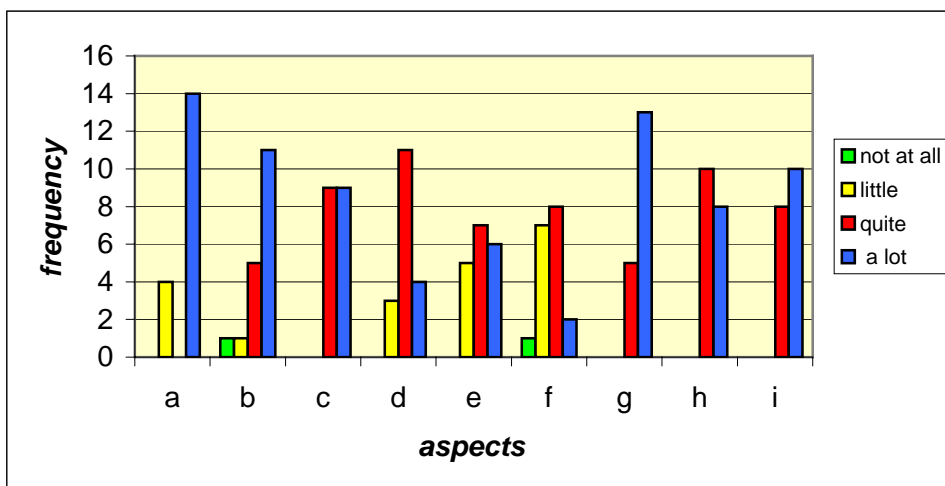
For the E&M group good basic preparation is thought not to be fundamental, but can help in the progression of one's career.

The E&M students who consider the compatibility of private life and work to be important also believe that the availability to move to different locations does not necessarily effect their career progress. On the contrary the girls of McE believe that the availability to change location is quite an important factor.

In the case of 'sacrificing the family' the two groups react in different ways: the E&M group do not believe that this factor influences their career progress, but can help it; the McE group however, consider it to be of little importance.

For both groups, 'to be firm and determined with relations with others' is necessary for an advance in one's career, while 'flexibility of one's time and role' is a factor that the girls of E&M consider necessary and the girls of McE important, but not excessively.

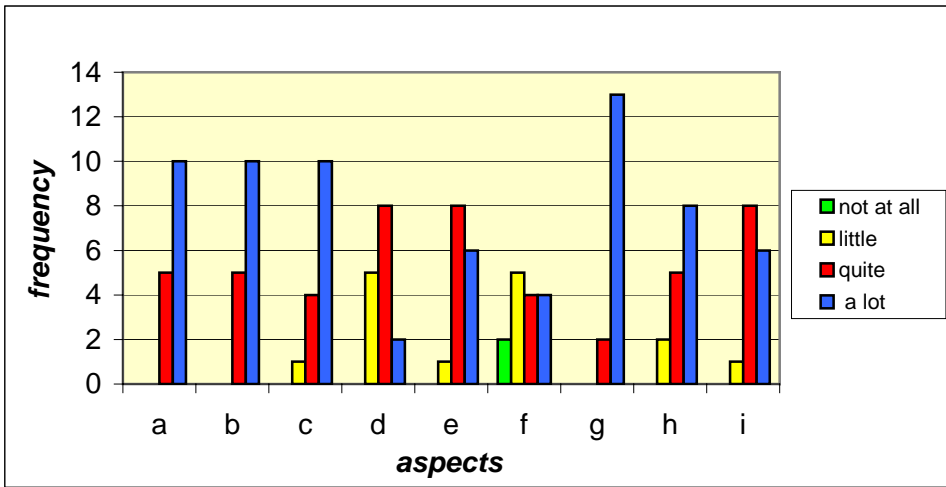
Graph 3: How much are the following aspects important to facilitate the progression in career (E&M)



Keys of graph 3

- a. passion for what one does
- b. constant employment
- c. capacity to cope with hard work
- d. good basic preparation
- e. availability to transfer
- f. to be able to sacrifice the family
- g. flexibility of time and role
- h. to be determined in relations with others

Graph 4: How much are the following aspects important to facilitate the progression in career (McE)

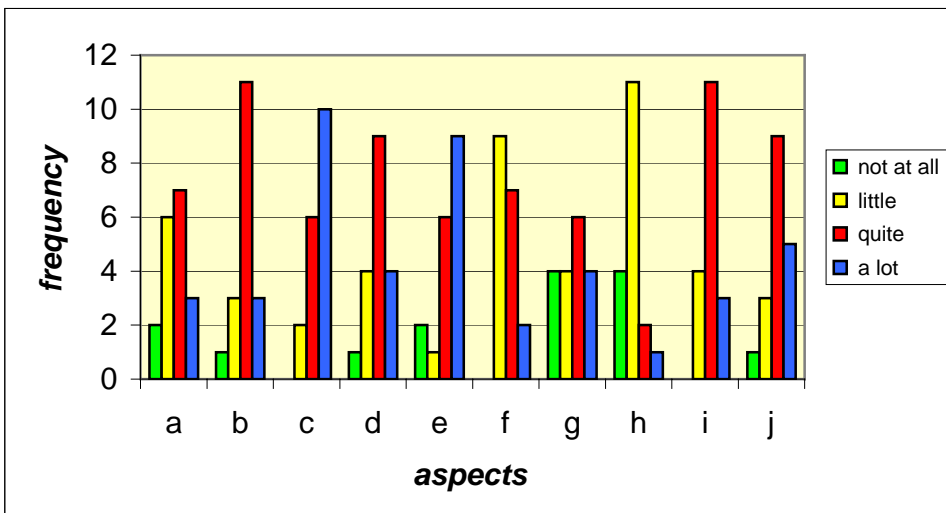


Keys of graph 4

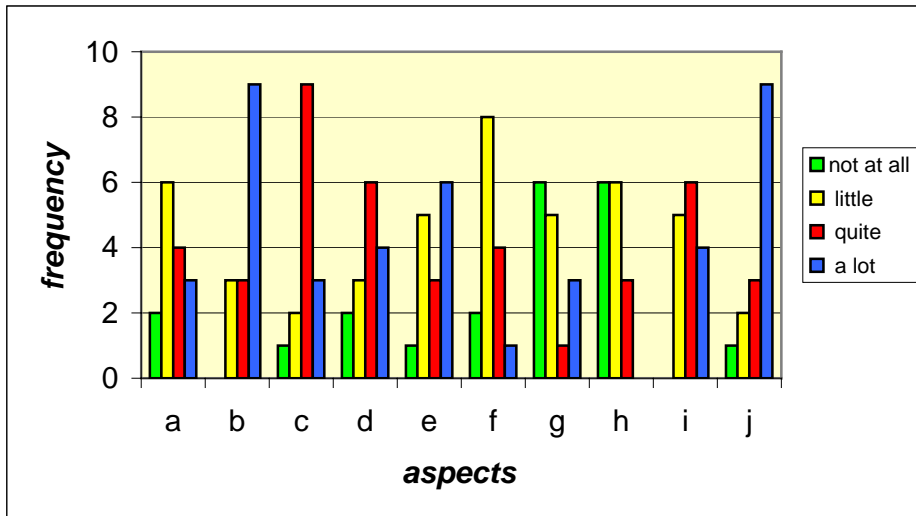
- a. passion for what one does
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- d. good basic preparation
- e. availability to transfer
- f. to be able to sacrifice the family
- g. flexibility of time and role
- h. to be determined in relations with others

From graphs 5 and 6 it emerges that the role played by the personal involvement in other people's problems' may be different from case to case. For the majority among both groups, the involvement in other people's problems does not necessarily seem to hinder the progress of career.

Graph 5: How much the following aspects hinder the progression in career (E&M)



Graph 6: How much the following aspects hinder the progression in career (McE)



Key of graphs 5 and 6

- a. involvement on other people’s problems
- b. under valuation of one’s own ability
- c. difficulty to balance private life with work
- d. strong competition at the work place
- e. absence of clear personal objectives
- f. hard work
- g. men in the highest position
- h. role models to be inspired by
- i. unavailability to be transferred
- j. little interest to take roles of responsibility

‘The under valuation of one’s own capabilities’ is believed to be a very unfavourable obstacle by nearly all of the girls of McE; even more than the girls of E&M. Perhaps as the ‘female mechanical engineers’ have based their choices mainly on their own abilities.

The ‘difficulty to combine private life and work is considered to be of modest importance for the E&M sample, while it is the factor least viewed as an obstacle by McE.

It seems the girls of both fields are in accordance of not to give large importance to the ‘strong competition at the work place’, as a factor to hinder progression in career.

The stereotypes regarding the ‘men in the highest position’”, does not seem to emerge from the interviews on the girls of E&M. The women of McE think this even more.

‘To have more role models to be inspired by’, can help in advancing one’s career. For both the samples of girls it is not very important to have role models from which to be inspired.

For the average of interviewees of the McE group, ‘the unavailability to be transferred’ is a factor that can quite hinder the career progression.

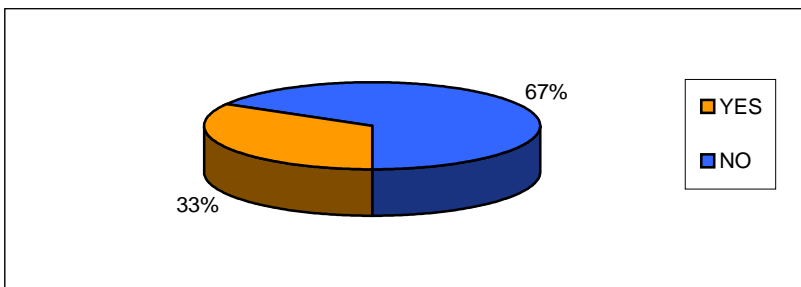
Regarding the 'little interest to take roles of responsibility', the majority of the interviewees of E&M, believe it can hinder the career yet there is also a small percentage that believes the contrary. The girls interviewed of McE believe that a poor interest in taking roles of responsibility can be an obstacle.

The female students believe the characteristics that are important in carrying positions of leadership are: strength of character, confidence in one's own abilities, tenacity, decisional power, determination, initiative, ambition, commitment, clarity of objectives, conviction, self control. These characteristics must be integrated later on with other skills gained on the job, such as how to build relationships, to work as a team, to be approachable towards the employee, to be respected and to be well organised.

► **PLANNING AND WISHING TO FOUND A COMPANY**

For the Engineering Management students, 6 out of 18 interviewees said they intended to found their own company (graph 7).

Graph 7: Planning to found a company (E&M)

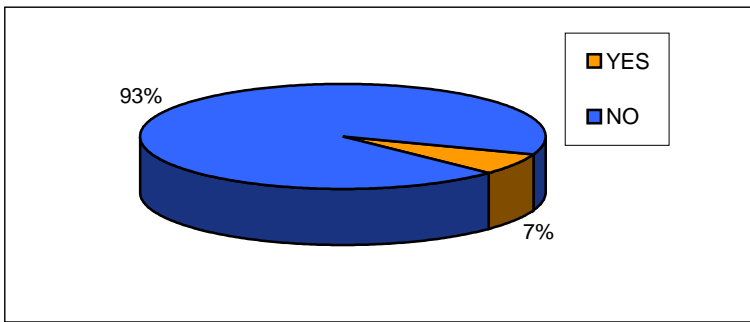


The main motivations are (graph 9): to work independently without supervision, to obtain a consistent wage and personal fulfilment and satisfaction.

Among the 12 negative responses, the most popular motivations (graph 10) are that there is too much risk and finances needed. More specific reasons include, having to start from the bottom and they do not think that it is necessary to establish a company to feel fulfilled.

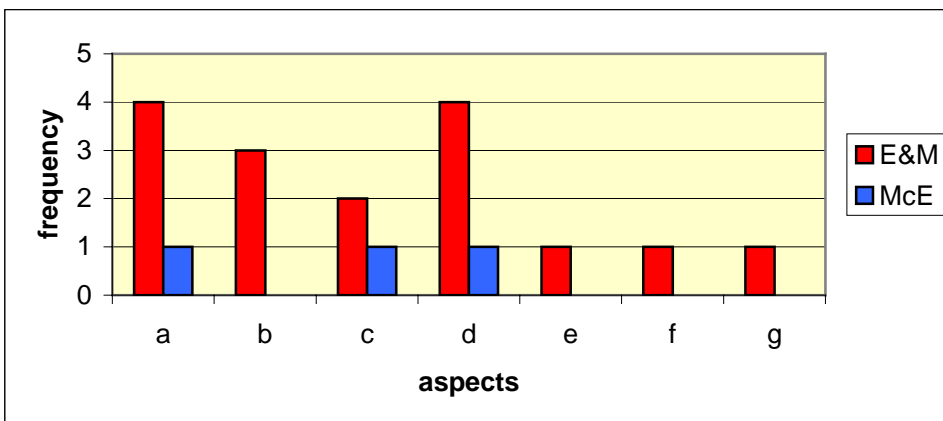
With regards to the McE degree (graph 8), there is only one positive case. For the negative responses, instead, the main reasons were (graph 10) due to financial investment, not the adequate skills to found a company and having to balance family and work.

Graph 8: Planning to found a company (McE).



One of the main reasons for not intending to found a company from McE students is the fear of a competitive market.

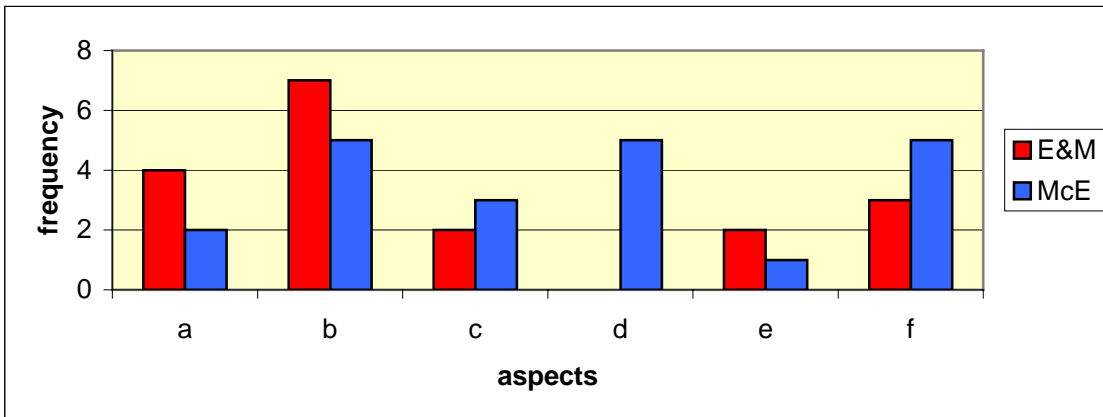
Graph 9: Reason for wanting to found a company



Key for graph 9

- a. to work independently
- b. potential wage
- c. freedom to manage 'time'
- d. personal satisfaction
- e. inheritance of family business
- f. other

Graph 10: Reasons for not wanting to found a company



Key of graph 10

- a. too risky
- b. financial constrains
- c. to balance family and work
- d. lack of skills
- e. too much time to devote to work
- f. other

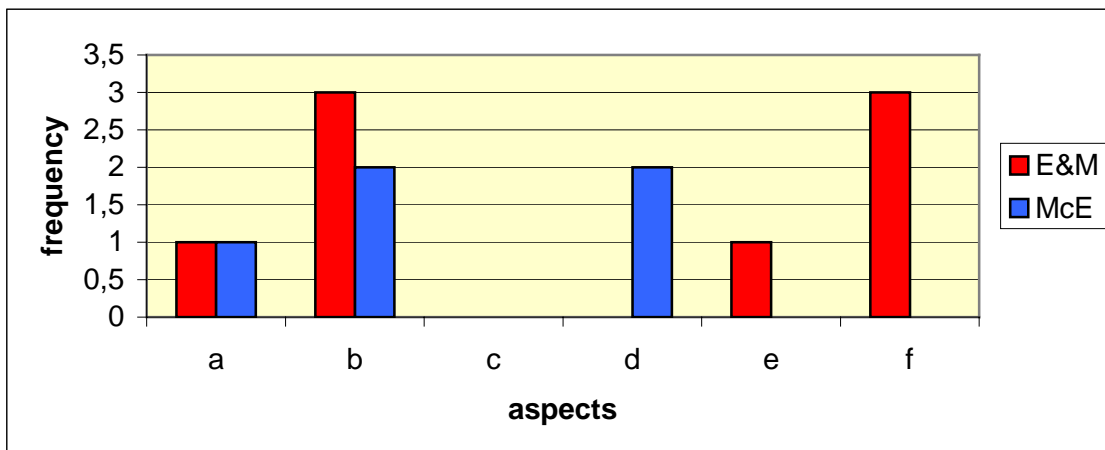
Most of the E&M students have not been encouraged to become an entrepreneur. Approximately 6 girls out of 18 said they have been stimulated to found their own company and half of these said they would like to become an entrepreneur (graph 11).

The sources from which the students have been encouraged to become entrepreneurs are firstly the parents, then university academics and then having attended an entrepreneurship course for young people (graph 12).

The university could stimulate graduates to become entrepreneurs by introducing initiatives such as organising meetings with entrepreneurs, organising courses on company management and start up, work placements and visits to companies.

From the sample of McE students, some girls have been encouraged to become entrepreneurs mostly by their parents, entrepreneurs and university academics of their faculty (graph 11). These girls gave the same suggestions as E&M students as support from university to stimulate start up from students.

Graph 11: Who/what has encouraged to become an entrepreneur.



Key of graph 11

- a. university academics
- b. parents
- c. career guidance office
- d. entrepreneurs
- e. entrepreneurship course
- f. work placement in a company

Which aspects are important in starting up a company (see graphs 12 and 13) were studied.

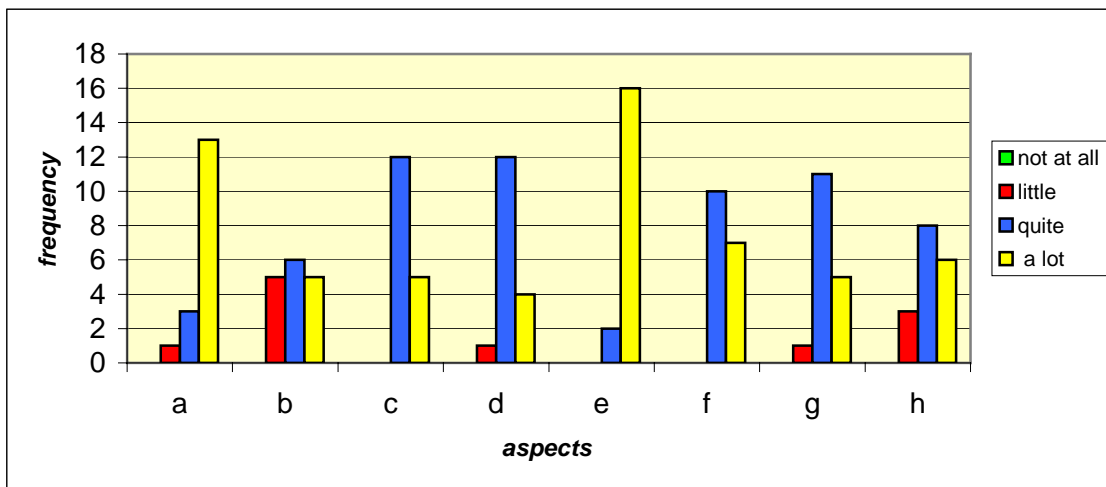
According to the sample of E&M students, 'managerial ability and a knowledge of the market' are believed to be very important. Other aspects that are quite important are: business and legal knowledge, knowing how to use new technology, accessibility of finances and being able to produce a business plan.

Work experiences and the psychological support from family and friends are considered to be less important aspects.

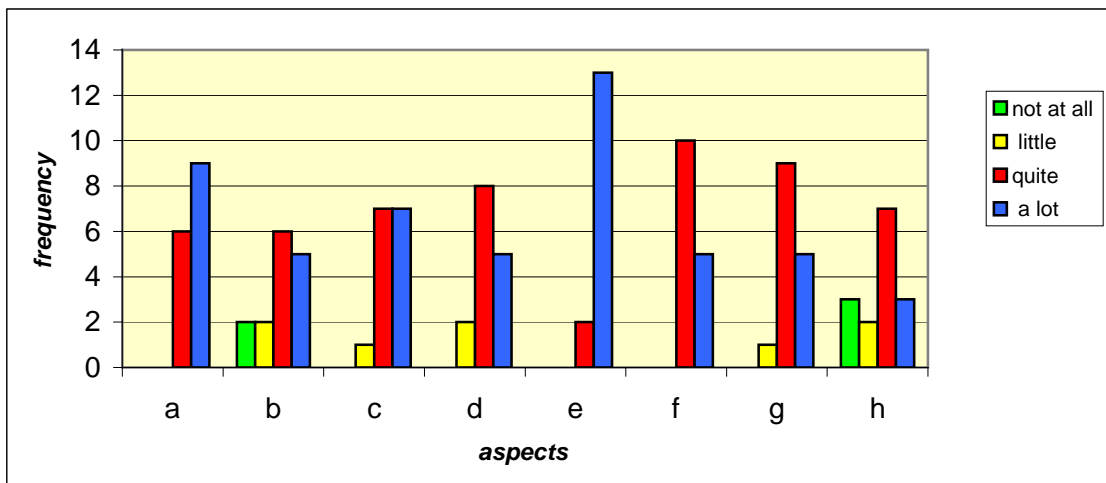
For the sample of McE students, the knowledge of the market is the most important aspect. Subsequently, they place in order of importance, managerial ability, ability to use new technology, accessibility of finances, being able to produce a business plan and business and legal knowledge.

As in the previous case, 'work placements and psychological support from family and friends are less important aspects.

Graph 12: How much the following aspects are needed to start up a company (E&M)



Graph 13: How much the following aspects are needed to start up a company (McE)



Key of graphs 12 and 13

- a. managerial skills
- b. work placements
- c. ability to use new technology
- d. business and legal knowledge
- e. knowledge of the market
- f. ease in obtaining financial funds
- g. ability to draw up a business plan
- h. psychological support from family and friends

With reference to action from university, the E&M students are in favour of the University organising an entrepreneurship course and meetings with female entrepreneurs. The few interviewees that would not attend this course are not interested in entrepreneurship. The McE students are also interested in attending this type of training course even if they have not planned to found their own company.