# Academic Expectations for Engineering Freshmen: Gender Differences

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***Abstract*—Faced with some massification, it becomes relevant to know what academic expectations the students present upon their entrance in the university. These expectations, reflecting aspirations and perceptions of self-efficacy in overcoming the difficulties inherent to the transition, are considered as a determinant variable of the degree of involvement, adaptation and academic success of students, throughout the first semester in higher education. We applied a questionnaire to the first-year students. The results obtained indicate that all students formulate high expectations regarding their university attendance. The expectations for a career or employment are those that reach higher scores, suggesting the strong association that students make between course attendance and future employment. Female students present better study methods, in secondary education, and anticipate less difficulties with their transition to university. They are better at fixing and completing study schedules, finishing their work within the fixed timeframes, and making prior plans.**

***Keywords—academic expectations, engineering students, first-year students, gender***

## I. INTRODUCTION

After the Portuguese Democratic Revolution in April 1974, the number of young people who have entered higher education in Portugal has increased exponentially. "Elites' learning" became "mass education", and this has significantly increased the diversity of students in terms of skills, motivations and vocational projects. As a consequence, some difficulties in academic adaptation occur to students in the first year, sometimes not adequately solved, resulting in failure and even drop out. In Portugal, about half of the students do not enrol the course or the institution of their first choice, making this a complex situation. This is due to numerus clauses used by the Portuguese government, meaning that placements are the result of the average classifications of high school and national exams used to access higher education [1].

The entrance in higher education presents several challenges for students, particularly those who belong to socio-cultural groups with a lower family tradition of higher education attendance. These difficulties are reported on international literature [2][3] and one of the variables studied is related to students' academic expectations. Having positive expectations to meet the demands of the new academic context is necessary, but some students enter with too low expectations due to a lack of vocational aspirations or because they enter courses that are not their first choice. At the same time, some students, who have little knowledge of the academic reality, reveal overly optimistic and often unrealistic expectations, which they soon realize will not be able to be achieved resulting in frustration and anxiety [4][5]. In summary, students entering with less ambitious expectations report higher levels of stress and depression, on the other hand, students with high expectations are easily discouraged and disinvested.

Academic expectations arise in research as one of the variables that impact on the quality of transition to students' adjustment to higher education. Students with more positive expectations that they will realize their dreams and overcome difficulties the challenges posed by this new academic context are better, while students with overly optimistic and generally unplanned expectations or students with low expectations of success tend to present more difficulties in their adaptation and poor performance from the first weeks [5]–[10]

Academic expectations can be understood as a multidimensional construct, integrating different domains or types of expectations. Students do not apply to higher education with the same expectations profile, meaning that they differ when they want to invest in areas they most want to invest in, and also in areas where they anticipate to be more successful. This variability predicts students' adjustment and level of involvement in their academic and extracurricular activities [3][11]. Thus, many researchers suggest that academic expectations can be assumed as a multidimensional construct [12]. Following this multidimensional approach, seven categories have been considered in this study [13][14]:

*1) Vocational career and employment*, which involves students' education and training focus on career development and access to labour market;

*2) Personal and psychosocial development*, which involves several psychological characteristics, such as autonomy, self-concept, and self-efficacy;

*3) International student mobility*, which includes students' expectations to be involved in student exchange programs, and participate in internships in other countries to obtain an international education experience;

*4) Political engagement and citizenship*, which entails aspirations to transform society, to help people with social disavantages or engage in volunteer work;

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*5) Social pressure*, which includes students' desire to meet family and other relevant people's expectations and reciprocate society's investment in their education;

*6) Quality of education*, which involves developing technical and scientific competences, for example being engaged in research experiences and recent developments in their academic domains and

*7) Leisure and interpessonal relationship*, which is related to personal interest to participate in students' parties and leisure or extracurricular activities.

Several studies suggest academic expectations are related to student's gender. For example, some studies show that female students have a higher academic enrolment rate and better achievements in HE [15]. Women also dedicate more time to their curriculum learning activities, mainly classes and study and are more committed attaining their degree than men [15][16]. At the same time, women are more engaged in interpersonal interactions [17][18] and develop higher levels of motivation and participation rate in volunteer activities than men [16][19][20]. However, male students seem to benefit more from their social activities and interactions, namely in terms of social and political spheres. For example, men are more involved in students' association activities, which explains the more positive self-evaluation of leadership skills and competitiveness [18, 20]. These differences tend to be related to different forms of academic engagement with several implications on adjustment and achievement in higher education.

In this paper, we analyze the academic expectations of a sample of first-year engineering students, considering gender. Regarding this research field, our particular interest is to verify if in Portugal there are eventual differences in favour of female students in curriular and learning domains or in favour of male students in social domain, as described in literature.

## II. METHOD

### A. Participants

A sample of 736 first-year engineering students, belonging to a public university in the north of Portugal, was analysed. In this sample 494 students are male. This is a sample formed by traditional students largely composed by students with 17 and 18 years old.

### B. Instrument

In order to measure the students' academic expectations questionnaires of Academic Expectations (QAE) were used [13].

These questionnaires include 42 items, distributed as follows, with 6 items in each of them:

1) Training for employment;
2) Personal and social development;
3) Student mobility;
4) Political engagement and citizenship;
5) Social pressure;
6) Quality of education;
7) Social interaction.

A 6-point Likert-type scale, ranging from 1 (strongly disagree) to 6 (strongly agree), was used. Adequate reliability and validity coefficients have been obtained in previous studies [13][14].

### C. Data Collection and Analysis

Academic Expectations Questionnaires has been filled in by students on their enrolment at the university. Students have been informed about the objectives and the confidentiality of data collection and they accepted to participate in this study.

The statistics analysis has been carried out with IBM SPSS Statistics for Windows (version 23).

## III. RESULTS

Regarding the students' profile, we found out that the ages range from 16 to 41 years old ($M = 18.29$, $SD = 2.01$).

Only 41.4% of the students have been enrolled in vocational guidance sessions during basic or high school, and the Grade Point Average (GPA) classification access to university ranges from 107 to 200 ($M = 154.60$; $SD = 18.01$).

Also that 52.5% have been enrolled in a course of first choice option (but the university was chosen as their first option by 71.4% of these students).

Finally, 37.2% of the students left their parents' home when they entered university and 69.6% of them are absolutely convinced that they will finish their master's degree in which they have been enrolled.

Table 1 presents the number of students ($n$); mean ($M$) and standard-deviation ($SD$) of scores in seven dimensions of academic expectations.

The values are separated by gender (*FS* = female students: *MS* = male students)

TABLE I. MEANS AND STANDARD DEVIATIONS BY GENDER IN SEVEN DIMENSIONS OF ACADEMIC EXPECTATIONS

| Dimensions | *n* | | *M* | | *SD* | |
|---|---|---|---|---|---|---|
| | ***FS*** | ***MS*** | ***FS*** | ***MS*** | ***FS*** | ***MS*** |
| Training for employment | 245 | 491 | 33,66 | 32,79 | 2,89 | 3,03 |
| Personal and social development | 241 | 489 | 32,86 | 31,54 | 3,28 | 3,29 |
| International student mobility | 240 | 487 | 30,38 | 27,86 | 4,60 | 5,22 |
| Political engagement and citizenship | 240 | 490 | 30,56 | 28,30 | 3,95 | 4,42 |
| Social pressure | 239 | 488 | 28,16 | 26,85 | 5,40 | 5,79 |
| Quality of education | 239 | 492 | 31,64 | 30,04 | 3,30 | 3,67 |
| Leisure and social interaction | 241 | 488 | 29,88 | 28,95 | 4,22 | 4,48 |

Comparing the means by gender, using the t-test for independent groups, a statistical significant difference was obtained in all dimensions: Training for employment ($t$ = 3,707, $df$ = 730, $p$ < .001); Personal and social development ($t$ = 5,114, $df$ = 728, $p$ < .001); International student mobility ($t$ = 6.351, $df$ = 725, $p$ < .001); Political engagement and citizenship ($t$ = 6,704, $df$ = 725, $p$ < .001); Social pressure ($t$ = 2,941, $df$ = 725, $p$ < .01); Quality of education ($t$ = 5,729, $df$ = 729, $p$ < .001); and Leisure and Social interaction (i = 2.682, $df$ = 727, $p$ < .01). In all these cases, female students present higher levels of academic expectations.

In Fig. 1, we can observed the differences on means by gender as well as where these differences are less or more expressive.

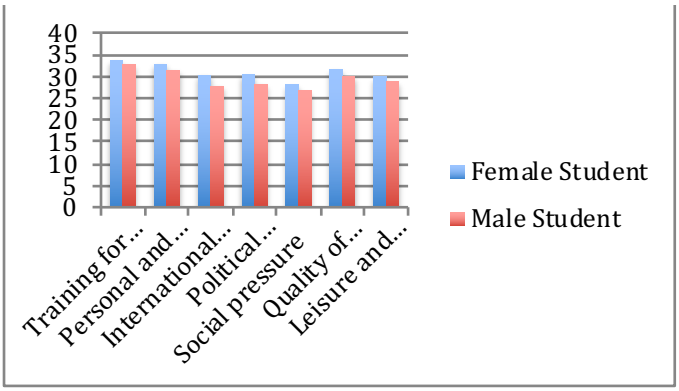


Fig. 1. Mean by gender.

## IV. Discussion and Conclusion

With higher education expansion more differentiated students access the university. In general, new public arrive to higher education, namely older student, minority groups, international or low social-cultural students. At the same time the democratization introduces problems of massification when students are quite different in terms of motivation, vocational projects, learning competencies, academic background and social-psycho maturity.

In order to prevent some adjustment difficulties, more frequent during the first-year, it is necessary to identify some variables which impact academic performance and success. On the literature, initial academic expectations of students assume a relevant role on students' adaptation and engagement in academic activities. Positive and realistic expectations can be seen as a good predictor of students' capacities to overcome the necessary changes to higher education. Best adjustment to University can be expected if students believe they are able to cope and to adapt positively face some difficulties and challenges. At the same time best adjustment is required to decrease first-year students drop-out and academic success in the university.

Concerning academic expectations the literature suggests that female students enter HE institutions with higher levels of academic expectations, which seems to be related to their better rates of engagement, permanence and better academic marks. So, in this study our goal was to observe if in engineering courses, where traditionally male students are predominant, there was also a trend for higher academic expectations of female students. The results present the same pattern of scores in the seven sub scales of the questionnaire. Data shows that women have higher enrolment in studying and achievements in HE, as well as in academic activities on campus [15]–[18]. These gender differences have been more expressive on some dimensions of expectations, like personal and social development, international student mobility, political engagement and citizenship and quality of education. Perhaps as in engineering graduation as well as in profession the male are represented in a large scale, female students need to invest more in academic life in its different domains to contrary the stereotype of gender associated with this scientific area. This interpretation can be also be used to explain the minor differences on social pressure, leisure and social interactions dimensions.

Several implications can be considered from this study. It is impossible to analyse academic expectations without study the students gender when we considered engineering education. The reason for that is because there are significant differences between them, the existence of a dominant stereotype gender culture saying that engineering course and profession are mainly for men, meaning that female students must present high level of engagement and achievement, presenting more positive expectations in order to have success in this vocational area. This aspect can be problematic, as I can for example introduce some stress in daily academic activities in female students. Sometimes an high level of positive expectations can be satisfied face to the conditions and reality of higher education institutions.

Some limitations can also be mentioned in this study. The expectations have been assessed when students do their enrolment at the university, therefore without any previous contact with the institution nor the academic life. Perhaps one or two weeks will be necessary to have a more realistic measurement of the students´ academic expectations. Also, the sample was taken without any representatively criterion. Next studies must consider a randomized sample of engineering students. Finally, it would be relevant to assess students´ academic expectations along the first year period, in order to analyse eventual changes in initial patterns, as well as the impact of the levels of academic adjustment to collect suggestions on good practices for the reception of first-year students by institutions.

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