



## Trends and Patterns in Subject Choice by Science Students at Sixth Form Level in Malta

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### Abstract

*Education is crucial and it entails important choices at various stages during a student's secondary and post-secondary years. At certain stages of their schooling, students need to choose the subjects to study and such decisions affect their future careers and working lives. Students are 'influenced' in their subject choice by a number of factors, such as a preferred career path, influence of parents and/or peers, etc. In Malta, following secondary school, at 16 years of age, students choose their Advanced (A) level subjects at post-secondary level, that has a direct bearing on their eventual tertiary education. This study investigates the reasons influencing subject choice at Sixth Form level. The research sample consisted of two groups of post-sec second-year Science students, namely 243 A level Biology and Chemistry (BC) and 116 Pure Mathematics and Physics (PMP) students. The student questionnaires were constructed following an investigation conducted with eight experts, who were requested to list three factors that influence students in their A level subject choice. The outcome showed that the experts, the BC and the PMP student groups did not always concur on the most or least influential factors for subject choice. The students identified career aspirations as the most influential factor for subject choice. Experts indicated career aspirations and subject difficulty as the main influences. There was no clear agreement between BC and PMP students, and experts on the least influential factors (from SEC exam results, family and peer influence, and lack of passion towards the subjects).*

**Keywords:** subject choice; Sixth Form; science subjects;

## 1. Introduction

### 1.1 Aim of the Research Study

The purpose of this study was to elicit trends and patterns in subject choice of science students at Sixth Form level. Six factors which influence students to choose or not Biology and Chemistry (BC) or Pure Mathematics and Physics (PMP), at Sixth Form level were considered. These factors were identified in a prior investigation with eight experts.

### 1.2 The Choice of A Level Subjects in Malta

"The post-secondary sector represents a critical stage in the learning journey of young people." (Ministry for Education and Employment, 2017, p.31). Teenagers between the ages of 16 and 18 can undergo a two-year post-secondary course at a Sixth Form institution, which prepares students for the Matriculation Certificate (MC) exams. The MC gives access to tertiary education institutions (Government of Malta, 2015a; 2015b).

### 1.3 Factors influencing Subject Choice

Many studies show that subject choice is affected by a number of factors (Ashworth & Evans, 2000; Ashworth & Evans, 2001; Van de Werfhorst, Sullivan & Cheung, 2003; Goodrum, Druhan & Abbs, 2012). Ashworth and Evans (2001) argue that, first and foremost, students choose a subject for further study if they find it interesting and/or enjoyable; they can also be influenced by peers. Another study carried out by Ashworth and Evans (2000) shows that the perception of difficulty and the grades achieved might also affect subject choice. This is where student ability can also impact subject choice (Van de Werfhorst et al., 2003). Another factor in play is university course requirements (Goodrum et al., 2012).



## 2. Methodology

For this study, a mixed methods approach was used. Cohen et al. (2011) argue that the mixed methods approach “yields real answers to real questions ... [and] ... avoids mistaken allegiance to either quantitative or qualitative approaches on their own” (p.26). Three different questionnaires were used. The first questionnaire was given to eight experts in the field. According to the responses, the other two questionnaires for students were formulated. The latter were distributed to two purposive samples in post-secondary institutions.

Rank ordering was the major data scale used for the student questionnaire. Respondents were asked to rank six factors, where ‘1’ and ‘6’ represented the highest and lowest priorities respectively. This data scale could have been problematic for some who find it hard to prioritize between the factors. Therefore, as recommended by Cohen et al. (2011), an open-ended question was also included to enable them, if they wished, to include any other factor: “It is the open-ended responses that might contain the ‘gems’ of information that otherwise might not be caught in the questionnaire” (p.392).

The two student population samples were chosen from six different Sixth Form schools in Malta and Gozo. A total of 363 questionnaires were collected: 245 BC students and 118 PMP students. However, as some questionnaires were filled incorrectly, the final number of ‘appropriate’ questionnaire responses was 243 BC and 116 PMP. Subsequently, the data from the student questionnaires were inputted onto Excel spreadsheets, and the average rating for each factor was computed, where the most popular factor was indicated by the lowest average rating value, and vice versa.

## 3. Analysis of Results

### 3.1 The Factors chosen by the Experts

Table 1 shows the six most popular factors presented by the experts, subsequently presented for rating by the BC and PMP student cohorts. Table 2 shows how the factors were coded for easier handling and representation.

Table 1. The most popular factors chosen by the experts

<b>Factors affecting students to choose A level subjects</b>	<b>Factors affecting students not to choose A level subjects</b>
Students wish to follow a career that requires these subjects	Students find the subjects difficult
Students are encouraged by results obtained in previous (SEC) exams	Students wish to follow a career that does not require these subjects
Students are influenced by their family and/or friends	Students are discouraged by results obtained in previous (SEC) exams
Students have a passion for the subjects	Students are discouraged from choosing these subjects by their family and/or friends
Students believe there are more opportunities and options for employment if they study these subjects	Students believe they might not succeed in the subjects/area
Students believe they can succeed in the subjects/area	Students might not have a passion for the subjects

Table 2. Coded factors for BC and PMP student cohorts

<b>Code</b>	<b>Factor</b>	<b>Code</b>	<b>Factor</b>
<b>BC-C-1 or PMP-C-1</b>	I want to follow a career that requires these subjects	<b>BC-NC-1 or PMP-NC-1</b>	I want to follow a career that does not require these subjects
<b>BC-C-2 or PMP-C-2</b>	I have a passion for the subjects	<b>BC-NC-2 or PMP-NC-2</b>	I do not have a passion for the subjects
<b>BC-C-3 or PMP-C-3</b>	I believe that I can succeed in the subjects/the area	<b>BC-NC-3 or PMP-NC-3</b>	I might not succeed in the subjects/the area
<b>BC-C-4 or PMP-C-4</b>	I was encouraged by results obtained in previous (SEC) exams	<b>BC-NC-4 or PMP-NC-4</b>	I was discouraged by results obtained in previous (SEC) exams
<b>BC-C-5 or</b>	I wasA influenced by my	<b>BC-NC-5 or</b>	I was discouraged by my



<b>PMP-C-5</b>	family/friends	<b>PMP-NC-5</b>	family/friends
<b>BC-C-6 or PMP-C-6</b>	There are more employment opportunities with these subjects	<b>BC-NC-6 or PMP-NC-6</b>	I think the subjects are difficult

### 3.2 Factors influencing BC and PMP Students' Subject Choice at A Level

The factors presented to the two student cohorts will be discussed according to the average rating obtained and the experts' rating order.

#### 3.2.1 Factors influencing BC Students to choose A Level Biology and Chemistry

Table 3 shows that experts and BC students agreed on the most influential factor, being career aspirations (BC-C-1). There is no agreement in the rank of the other factors impacting BC students' subject choice.

Table 3. Factors influencing BC students to choose science subjects

Factor	Experts Rating Order	BC Students Rating Order	Average Rating
<b>BC-C-1</b>	1	1	1.79
<b>BC-C-2</b>	4	2	2.59
<b>BC-C-3</b>	6	4	3.29
<b>BC-C-4</b>	2	5	3.90
<b>BC-C-5</b>	3	6	4.91
<b>BC-C-6</b>	5	3	3.06

#### 3.2.2 Factors influencing PMP Students to choose A Level Pure Mathematics and Physics

Table 4, like Table 3, shows that experts and PMP students agreed on career aspirations as the most impacting factor. The comparison of rating orders by experts and PMP students is similar to the rating orders of BC students, except for the 'belief of succeeding in the area' and 'more opportunities and options for employment' placed third and fourth respectively. There was no clear agreement amongst experts, BC and PMP students.

Table 4. Factors influencing PMP students to choose science subjects

Factor	Experts Rating Order	PMP Students Rating Order	Average Rating
<b>PMP-C-1</b>	1	1	1.90
<b>PMP-C-2</b>	4	2	2.73
<b>PMP-C-3</b>	6	3	3.10
<b>PMP-C-4</b>	2	5	3.68
<b>PMP-C-5</b>	5	6	5.22
<b>PMP-C-6</b>	3	4	3.29

#### 3.2.3 Factors influencing BC Students not to choose A Level Pure Mathematics and Physics

Table 5 shows no agreement between experts and BC students, where BC students ranked no need of the subjects for their future career (PMP-NC-1) as most important whilst the experts gave top priority to subject difficulty (PMP-NC-6).

Table 5. Factors influencing BC students not to choose science subjects

Factor	Experts Rating Order	BC Students Rating Order	Average Rating
<b>PMP-NC-1</b>	2	1	2.10
<b>PMP-NC-2</b>	6	2	2.62
<b>PMP-NC-3</b>	5	3	3.34
<b>PMP-NC-4</b>	3	6	4.72
<b>PMP-NC-5</b>	4	5	4.66
<b>PMP-NC-6</b>	1	4	3.67

#### 3.2.4 Factors influencing PMP Students not to choose A Level Biology and Chemistry



Table 6, similarly to Table 5, also represents disagreement between the experts and PMP students, where the students rated 'I want to follow a career that does not require these subjects' as the main factor influencing subject choice (BC-NC-1), in contrast to the experts who rated subject difficulty as the prime factor (BC-NC-6).

Table 6. Factors influencing PMP students not to choose science subjects

Factor	Experts Rating Order	PMP Students Rating Order	Average Rating
BC-NC-1	2	1	2.20
BC-NC-2	6	2	2.68
BC-NC-3	5	3	3.09
BC-NC-4	3	5	4.39
BC-NC-5	4	6	4.91
BC-NC-6	1	4	3.36

### 3.3 Analyzing the Open-Ended Questions

Participants brought up other factors that affected their subject choice: 41.2% of BC and 20.2% of PMP students. They suggested other factors such as: acquiring a comfortable lifestyle; subjects complementing each other; simply preference towards the subject/s; teacher impact; and not having the subjects at secondary school.

### 4. Conclusion

This study shows that the BC and PMP students ranked the factors influencing subject choice similarly, with slight differences when compared to the experts' ranking. Regarding the factors influencing student choice for A level Biology and Chemistry at post-secondary level, the experts and the BC students shared similar views, namely putting career requiring the subjects as the most influential factor. Similarly, the PMP cohort and the experts considered career aspirations as the prime factor. Rather than simply considering the ranking order, the other factors should also be seriously considered by the various stakeholders in the field. Furthermore, the outcomes of this study show that the rank order of the factors influencing subject choice in science as identified by the experts was different from that presented by the BC and PMP Sixth Form students.

### References

- [1] Ministry for Education and Employment (2017). The Working Group on the Future of Post-Secondary Education. Report to the Minister for Education and Employment. Floriana: Ministry for Education and Employment.
- [2] Government of Malta (2015a). Primary and secondary education. Retrieved February 4, 2018, from <https://www.gov.mt/en/Services-And-Information/Business-Areas/Education%20and%20Learning/Pages/Primary-and-Secondary-Education.aspx>
- [3] Government of Malta. (2015b). Higher and further education. Retrieved February 4, 2018, from <https://www.gov.mt/en/Services-And-Information/Business-Areas/Education%20and%20Learning/Pages/Higher-and-Further-Education.aspx>
- [4] Ashworth, J., & Evans, J. L. (2001). Modelling student subject choice at secondary and tertiary level: A cross-section study. *The Journal of Economic Education*, 32(4), 311-320.
- [5] Ashworth, J., & Evans, L. (2000). Economists are grading students away from the subject. *Educational Studies*, 26(4), 475-487.
- [6] Werfhorst, V. D., Sullivan, A., & Cheung, S. Y. (2003). Social class, ability and choice of subject in secondary and tertiary education in Britain. *British Educational Research Journal*, 29(1), 41-62.
- [7] Goodrum, D., Druhan, A., & Abbs, J. (2012). The status and quality of year 11 and 12 science in Australian schools (Prepared for the Office of the Chief Scientist). Canberra: Australian Academy of Science.
- [8] Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). New York: Routledge.