SFI STEM Research

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Foreword

Science Foundation Ireland (SFI) promotes and supports the study of, education in, and engagement with Science, Technology, Engineering, and Maths (STEM) and promotes an awareness and understanding of the value of STEM to society and, in particular, to the growth of the economy.

In an effort to gain a greater understanding of the attitudes and opinions of Irish third level students, SFI commissioned Amárach Research to carry out an online survey among third level undergraduate students. The survey was conducted amongst a representative sample of 2,000 students, based on quotas from the attendance levels recorded by the Higher Education Authority in 2012/2013.

Outlined in the document are five factors which have been identified as playing a central role in the selection (or non-selection) of STEM course. These include attitudes towards STEM in primary/secondary school, the feeling of fitting in and stereotypes towards STEM students, the perceived negatives of STEM courses, the availability of STEM subjects at Leaving Certificate level and the importance of STEM events, each of which is explained in further detail in the Discussion on Research Findings section.

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1.0 Introduction and Approach

1.1 Introduction

SFI was founded in 2000 as a sub-board of Forfás to administer the Technology Foresight Fund. In 2003, it was established as its own legal entity and prescribed with the following mission:

"To build and strengthen scientific and engineering research and its infrastructure in the areas of greatest strategic value to Ireland's long-term competitiveness and development".

SFI invests in academic researchers and research teams who are most likely to generate new knowledge, leading edge technologies and competitive enterprises in the fields of science, technology, engineering and maths (STEM). In addition to this the SFI also promotes and supports the study of, education in and engagement with STEM as well as promoting an awareness and understanding of the value of STEM to society and, in particular, to the growth of the economy.

As part of this SFI manages the Smart Futures initiative, which promotes STEM careers to post-primary students in Ireland. This study was commissioned to create a better understanding of what influences young people in their subject and career choices so as to inform engagement activities.

1.2 Research Approach

A draft questionnaire was prepared by Amárach Research based on discussions with SFI. Suggestions were made in relation to amendments and inclusions to the questionnaire by SFI. From continuous interactions between SFI and Amárach Research a final draft questionnaire was composed and tested by Amárach Research executives. The feedback received was integrated into the final questionnaire and the fieldwork commenced.

Fieldwork took place over a six week period in April and May 2014. The survey was completed online among a sample of 3,163 third level undergraduate students across 9 colleges and institutions that agreed to participate. The research was conducted among third level students so that an understanding of their full secondary school and college course selection experiences could be understood. It also gave us the opportunity to test their perceptions of Stem students versus their own classmates.

Over 2,000 students from the overall sample indicated that they were STEM students, while only 1,000 were non-STEM students. In order to create a more representative sample of undergraduate students, a final sample of 2,000 students was randomly selected to be aligned with the HEA figures from 2012/2013. As a result, 48% of respondents were STEM students while 52% were non-STEM students.

Permission to run the survey was obtained by 9 colleges and institutions around the country (University of Limerick; National University of Ireland, Galway; University College Cork; Dublin City University; Athlone IT; Limerick IT; Sligo IT; Dundalk IT; Tallaght IT). The survey was administered by each college to their undergraduate students via email invitations. Students who decided to take part were directed to a secure website where they could complete the survey.

1.3 Current Report

The results of the survey are considered in detail in Part 2 of the report. Results for the student group as a whole are presented first, followed by a breakdown of the data across a number of demographics: gender; age, and course type (STEM versus Non-STEM). Given the length of the survey and volume of data, the narrative highlights some of the marked differences and then refers the reader to tables for further information. Finally survey findings are discussed in terms of overall research considerations in Part 3.

2.0 Executive Summary

The central finding of the research relates to students' attitudes towards STEM courses and whether or not they feel they would fit in. Students put this fitting in factor above a number of other human and functional factors such as course career prospects, academic reputation, and the guidance of their parents. In order to ensure students choose the right course for them, it is important that course information they receive is correct and does not create misleading stereotypes (positive or negative).
In the next section of the report it is apparent that 'STEM' students are perceived by all to be more intelligent, career focussed, and less sociable than their peers. These stereotypes are more than likely the result of social learning, adopted from their parents, peers, teachers, and through media. These false perceptions can act as significant barriers as students may feel they won't fit in in a STEM environment. To overcome this, a holistic view has to be taken with regards to the ways in which STEM students and courses are portrayed to ensure a realistic image of the range and diversity is created rather than one built on stereotypes.

From the research it also became apparent that the availability of Science, Technology, and Engineering subjects at Leaving Certificate level was an important factor as students who had these options open to them (and selected them) were much more likely to go on to study STEM in college. While a wider conversation is required on availability, parents and students have a role to play in highlighting the demand for subjects to schools. This is unlikely to happen if incorrect assumptions and stereotypes continue to exist around STEM courses and students.

Building on this, the research shows that earlier factors may also play a significant role. The way in which attitudes to science change as children progress from primary to secondary school impacts on the decision, as those who say their impression improved, were more likely to choose a STEM course in college. It was also clear that attitudes are more likely to improve if they complete a STEM related subject at senior level.

Finally the research looked at the positive impact of STEM events (e.g. career talks, events, clubs, etc.) on course selection. These are generally well received (by those who end up picking a STEM or non-STEM course) and have been identified as a platform for establishing more realistic and true perceptions of STEM students and courses. Event and talk organisers should keep in mind the effect they can have on positively or negatively influencing that fitting in factor.

3.0 Research Findings

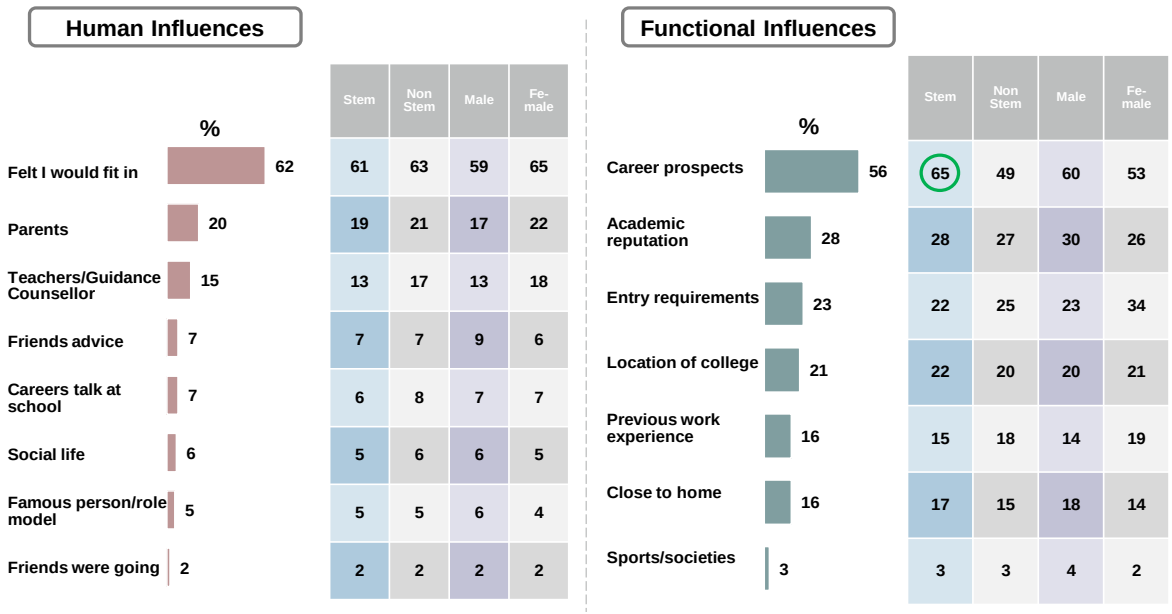
3.1 Influences in College Course Selection

Students were asked to describe what factors influenced their decisions to choose a STEM or Non-STEM college course. During the analysis phase of the research the influences were separated into 'human' factors (including personal and social influences) and 'functional' factors (including college and career factors). The biggest stand out factors influencing undergraduates' choice of college course were that they felt they would fit in (62% put this in their top 3), and career prospects of the course (56%). The fact that 'fitting in' ranked most highly is quite significant and is one we return to later when we discuss the stereotypes students hold towards STEM students. In addition to this we can also draw some conclusions about the different weightings students place on career prospects of the course/college; STEM students were more likely to put this in their top three than non-STEM students, another stereotype that expresses itself later as STEM students are seen as being more career focussed.

While 'fitting in' and career prospects were the main drivers, a number of other human and functional factors play a role for many students. In terms of functional factors, 28% of all students said the academic reputation of the institution/course was important while 23% said the entry requirements played a role in their decision.

Figure 1: Top 3 Influences Affecting College Course Selection

(Base: All undergraduate students – 2,000)



Looking again at the human forces driving course selection, we can also see that parents and teachers/guidance counsellors play a relatively modest role (20% and 15% respectively mentioned them in their top 3 factors) according to third level students. It is also clear that they play a greater role in the decision process for females as they outscore males for both of these human influences (i.e. parents influence - 22% and teachers/guidance counsellor influence - 18%). These human factors are likely to drive sentiment positively or negatively with regard to the extent that students feel they would fit in, with attitudes of parents, teachers and guidance counsellors being passed on to students.

With further in-depth analysis of the sample, it became possible to identify what influences were most impactful on students from a range of different college courses. Social science students were most likely to say they chose their course on the premise that they would fit in (76%) while the advice and influence of parents was more important for Health (29%), Law (33%) and Engineering (25%) students[1].

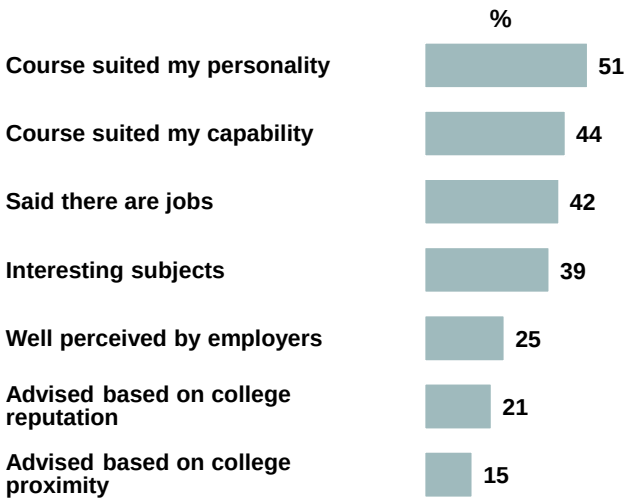
Across all course categories, the perceived influence of other human factors, such as friends' advice (7%), careers talks (7%), perceived social life (6%), and famous people/role models (5%), was relatively small. However, it could be the case that these contribute to course selection through their influence on the 'fitting in' metric rather than the final decision, i.e. the role of friends, careers talks etc. may heighten or decrease a student's sense that they will fit in at a specific course, which in turn has a strong impact on course choice.

Returning to the earlier point on the role of parents, further questions were included to expand on this. Of those who ranked the advice of their parents in their top 3 influences (n = 390), students report that parents were most likely to tell them that the course suited their personality (51%). This was typically advised to Non-STEM students (56% in comparison to 46%), and more so to females (59%) than males (42%). Parents of STEM undergraduates and of males are more likely to advise them based on the fact that there would be jobs after completing the course (52% and 48% respectively). STEM students are also more likely to be told that their chosen course would be well perceived by employers (30% in comparison to 21%).

[1] Only those courses where n was greater than 100 were considered for separate analysis

Figure 2: Advice Received from Parents/Guardians

(Base: All who got advice from parents/guardians – 390)



	Stem	Non Stem	Male	Female
Course suited my personality	46	56	42	59
Course suited my capability	47	42	40	47
Said there are jobs	52	33	48	37
Interesting subjects	39	39	37	41
Well perceived by employers	30	21	27	23
Advised based on college reputation	20	21	20	21
Advised based on college proximity	13	17	16	14

Based on this we can see that the advice given by parents is perpetuating or creating beliefs held by students in relation to STEM courses, i.e. whether or not they are less likely to match an individual's personality and/or offer benefits in terms of jobs and employer perception. Considering the importance students place on matching their own personalities with those of the prospective classmates this advice may influence a student's consideration in choosing a STEM course. Data discussed later in the report shows how the information received from parents (and other sources) regarding STEM careers may create unrealistic stereotypes of STEM students.

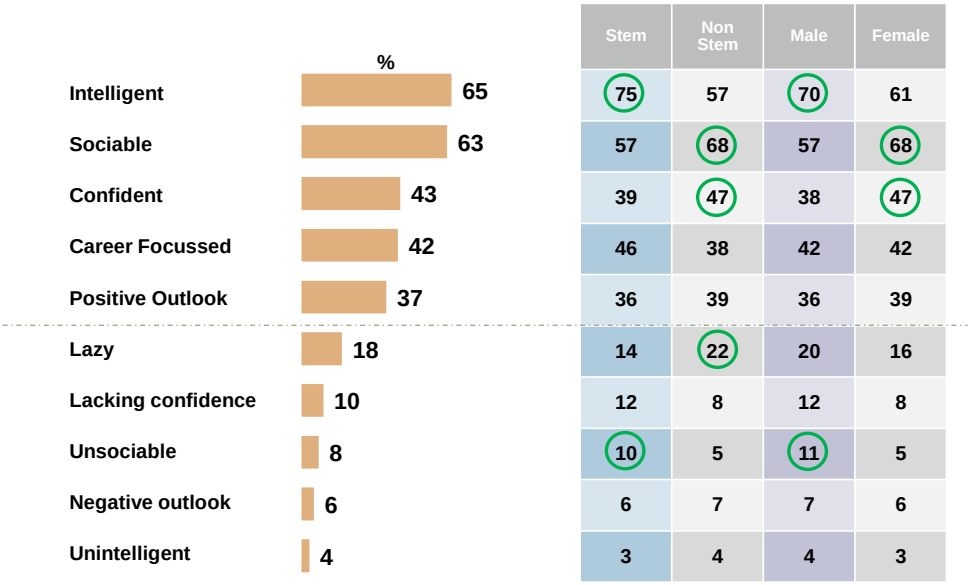
3.2 Attitudes towards STEM Students

Following on from the point on 'fitting in', this study also aimed to explore students' attitudes towards their fellow classmates and 'STEM' students. The objective here was to better understand the stereotypes students hold towards STEM students and to see if this impacted positively or negatively on their likelihood to pick a STEM course.

Looking first at the characteristics they attribute to their classmates, we can see that they are generally positive. 65% of all students (n = 2,000) said their classmates were intelligent while 63% said they were sociable. Comparing STEM and non-STEM students we can see some differences of opinion arising here, e.g. STEM students more likely to say their classmates are intelligent (75%) but unsociable (10%), while non-STEM students are more likely to say their classmates are Sociable (68%), Confident (57%), and Lazy (22%).

Figure 3: Characteristics of Students in Respondents' Courses.

(Base: All undergraduate students – 2,000)



	Stem	Non Stem	Male	Female
Intelligent	75	57	70	61
Sociable	57	68	57	68
Confident	39	47	38	47
Career Focussed	46	38	42	42
Positive Outlook	36	39	36	39
Lazy	14	22	20	16
Lacking confidence	12	8	12	8
Unsociable	10	5	11	5
Negative outlook	6	7	7	6
Unintelligent	3	4	4	3

Analysing the findings further made for some interesting comparisons between students from various college courses. When rating their classmates on various attributes, Arts and Social Work/Childcare students by in large poorly rated their classmates on intelligence (both at 49% versus 65% on average), whilst Engineering/Architecture undergraduates ranked their classmates quite highly on this metric (84%).

Reviewing negative attributions, 37% of Arts students felt their peers are lazy versus just 3% of Law undergraduates. Computer Science students are most likely to say their classmates are unsociable (20%) and lacking in confidence (17%). A full breakdown of positive and negative attributes are displayed in Figure 4.

Figure 4: Characteristics of Students in Respondents' Courses – Analysis by Course.

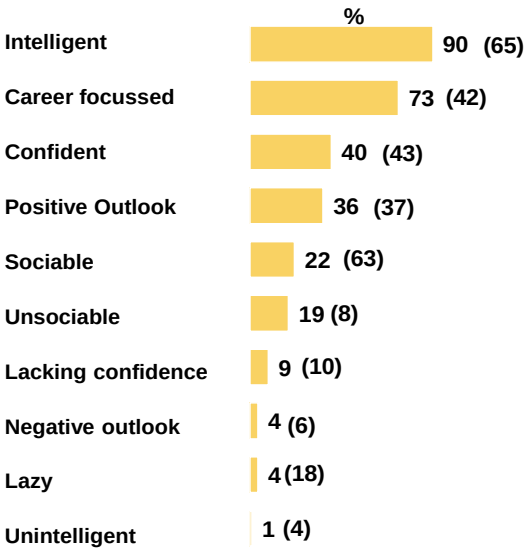
	Science (n=374)	Arts (n=288)	Business (n=257)	Health (n=221)	Eng/ Arch (n=179)	Social Sci/ Psych (n=114)	Comp. Science (n=109)	Law (n=104)	Soc. Work/ Childcare (n=102)
Intelligent	76%	49%	56%	83%	84%	59%	70%	74%	49%
Sociable	63%	72%	63%	62%	48%	72%	40%	40%	80%
Confident	37%	44%	43%	35%	35%	39%	37%	68%	41%
Career Focussed	39%	19%	54%	50%	57%	35%	43%	69%	43%
Positive Outlook	42%	42%	26%	37%	28%	41%	39%	14%	61%
Lazy	13%	37%	24%	3%	12%	20%	19%	11%	6%
Lacking Confidence	12%	10%	10%	4%	9%	9%	17%	3%	8%
Unsociable	8%	5%	7%	3%	14%	6%	20%	11%	2%
Lacking confidence	5%	12%	6%	7%	7%	6%	5%	4%	4%
Unintelligent	2%	6%	6%	1%	2%	4%	4%	4%	1%

Having ascribed metrics to their own class mates, all respondents were then asked to assign attributes to 'STEM' students, i.e. the overall group of STEM students. Based on Figure 5 overleaf, we can see that 'STEM' students were typically seen as intelligent (90%) and career focussed (73%). When compared to the average perception of students' own classmates, participants rated 'STEM' students significantly higher on these attributes (65% and 42% respectively).

However, not all metrics scored highly; reviewing the 'sociable' metric we can see that STEM students under-index by 41 percentage points versus the average (63% for respondents' own classmates versus 22% for STEM students). This is also true when we ask students who are undertaking STEM related college courses about 'STEM' students; 57% said their classmates were sociable but only 26% said this of STEM students in general.

Figure 5: Characteristics of Students in STEM Courses.

(Base: All undergraduate students – 2,000)



	Stem	Non Stem	Male	Female
Intelligent	89	90	88	91
Career focussed	69	77	68	78
Confident	42	38	39	41
Positive Outlook	39	32	37	35
Sociable	26	19	23	21
Unsociable	15	23	20	17
Lacking confidence	9	9	10	8
Negative outlook	4	3	5	2
Lazy	5	2	5	2
Unintelligent	1	1	1	1

On a whole, both STEM and Non-STEM students see the typical STEM undergraduate as more intelligent and career focussed but less sociable than their own peers. The fact that these opinions differ from those of STEM students when describing their own classmates indicates a misunderstanding of STEM courses and the type of student completing them. Given the importance placed on a feeling of 'fitting in' when selecting a college course, this stereotype may be acting as a barrier for students when making their decision.

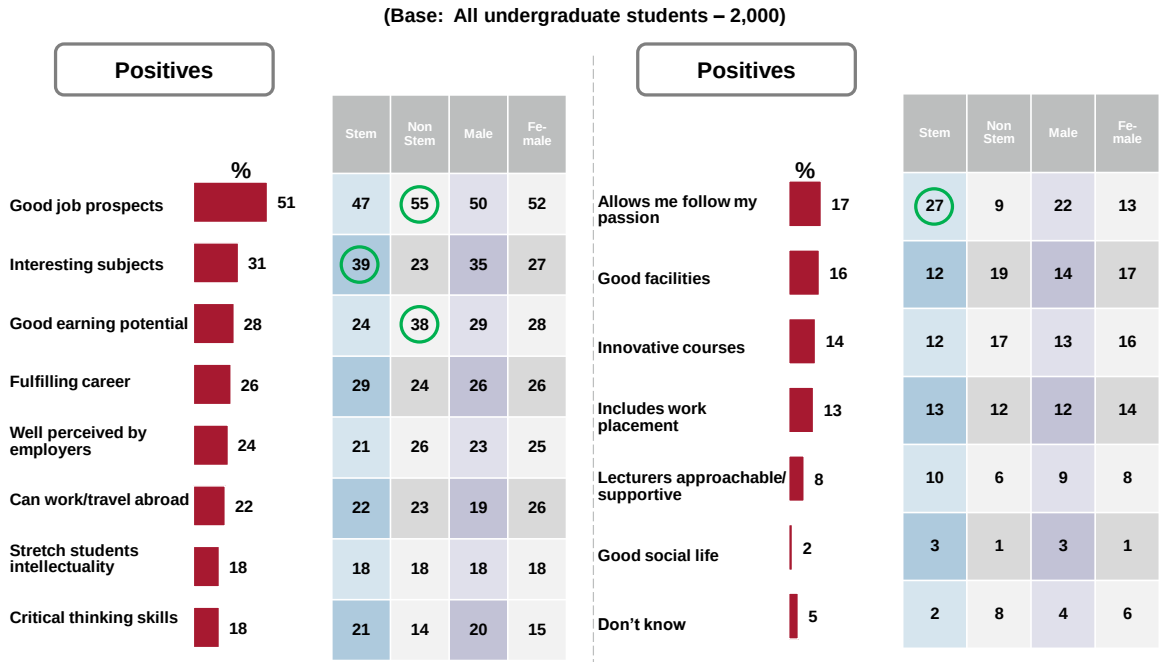
However, it is not fully clear from the research why these attitudes exist. Looking back to the advice provided by parents, the data suggests that they are more likely to highlight the career prospects (52%) and employer perceptions (30%) associated with STEM courses than parents of non-STEM students (33% and 21% respectively). However, it is likely that these attitudes are formed through a composite of social learning through media / the adoption of parent's and peers' attitudes and personal experiences.

3.3 Attitudes towards STEM Courses

All respondents were then asked to rate STEM courses using an agreement scale on a pre-determined list of positive and negative statements. These were similar to those expressed earlier as reasons for selecting a STEM course in college. Students (both STEM and non-STEM) felt STEM courses offer good job prospects (51%), good earning potential (28%), a fulfilling career (26%) and are well perceived by employers (24%). Interestingly, non-STEM students were more likely to say job prospects and earning potential are the main positives of STEM courses (55% and 38% respectively) further suggesting that non-STEM students are focussed on the external rewards linked with these courses.

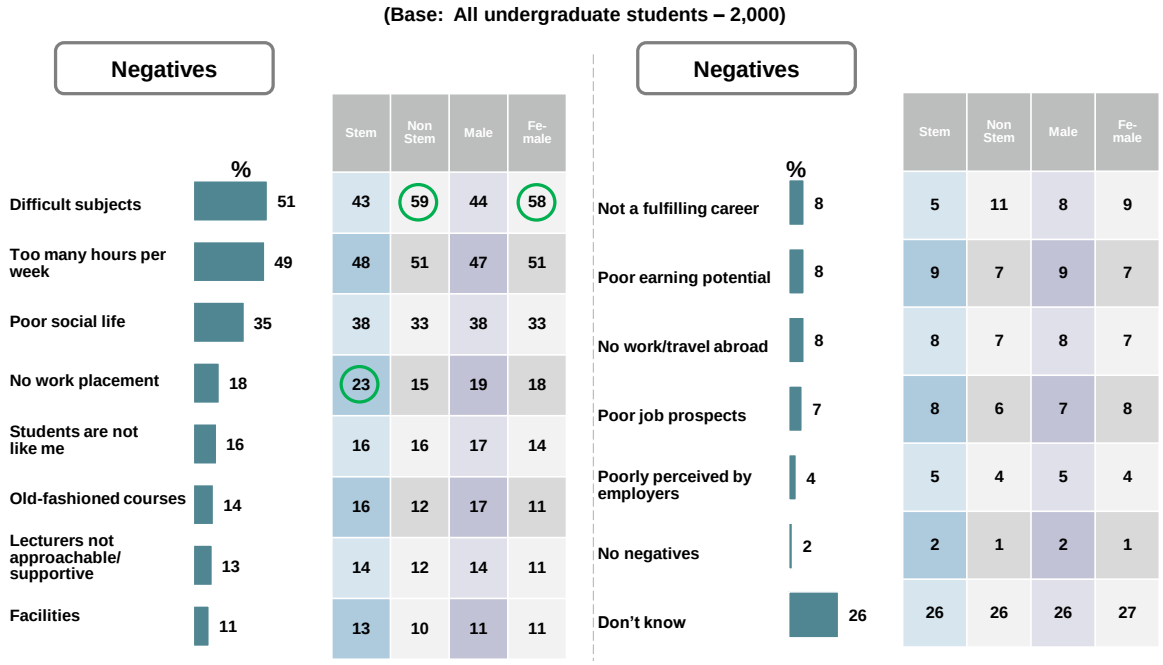
Students also felt STEM courses were interesting (31%) although this was driven by STEM students (39%) to a greater degree. Other intrinsic positives (e.g. stretching students intellectually and critical thinking skills) feature lower in the list, while just 2% of all students say STEM courses offer a good social life, supporting the attitude that STEM students are less sociable than others. Noting of course the full timetable concerned with STEM third level programmes.

Figure 6: Main Positives of STEM Courses.



Attitudes around the sociability of STEM students and courses carry through to the main negatives associated with STEM undergraduate courses. 35% of Irish undergraduates feel that STEM courses offer a poor social life (STEM students are more likely to agree with this – 38% vs. 33%), which is closely linked to having too many hours per week, the second biggest negative of STEM courses (49%).

Figure 7: Main Negatives of STEM Courses.

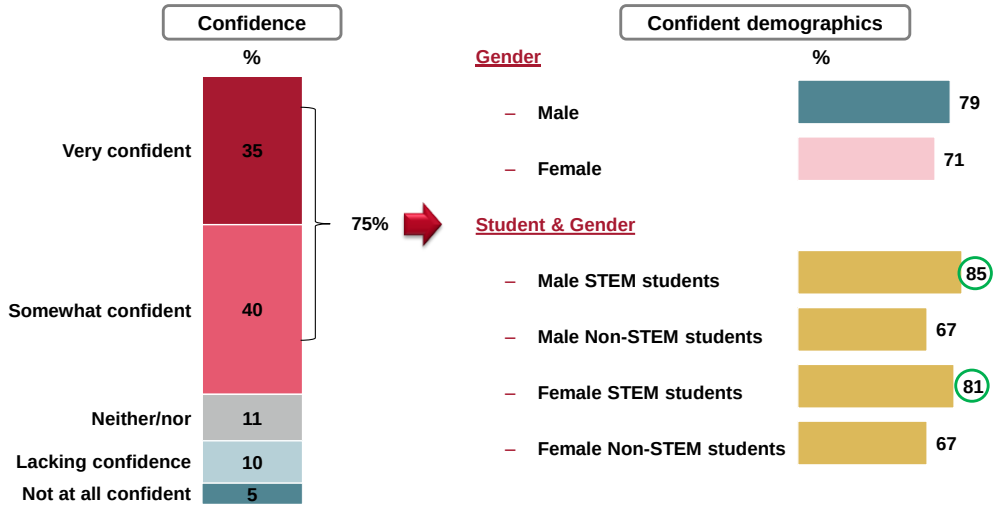


The biggest perceived negative however was 'difficult subjects' (51%), a sentiment more likely to be held among non-STEM students (59%) and females (58%). A further review of the data shows that Male-STEM students (18%) and Female-STEM students (16%) do not differ significantly in this regard. This perception is a double edged sword, while employers view it as a positive; it also acts as a barrier to entry for students who may well be equipped to complete a STEM course.

We then asked students to what extent they believe their course will result in a job/career they will enjoy in later life. Three quarters (75%) of students felt confident they would find a job they enjoy after college. STEM students were more likely to agree with this (84%). Further details are included in Figure 8 overleaf, where we can see slightly greater confidence among males, and significant gaps when crossing gender and course type.

Figure 8: Confidence that Student will get the Job they enjoy after Studies.

(Base: All undergraduate students – 2,000)



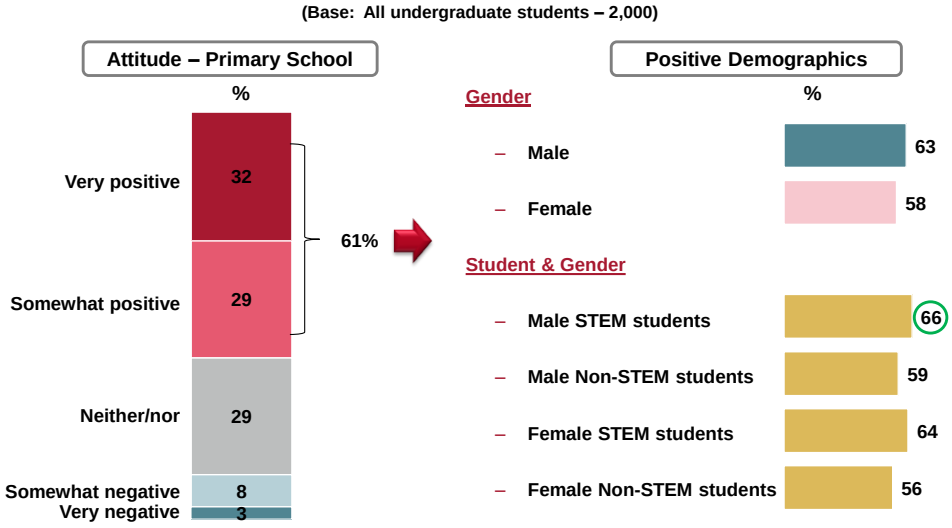
	STEM Students	Non STEM Students
Confident	84%	67%
Not confident	9%	19%

3.4 Attitudes towards STEM subjects in Primary/Secondary School

In order to better understand where these attitudes might come from, students were asked whether they had a positive attitude towards science in primary and secondary school. In this regard it is important to consider that undergraduate student respondents (many of whom would have finished primary school between 2005 and 2008) may not have had full exposure to science in the primary school curriculum as it was only introduced nation-wide in 2003. This is reflected in the data as 53% of those who had a negative at primary school level say they don't recall it being taught as a subject.

However, attitudes towards science at primary school level were typically positive (32% 'very positive' and 29% 'somewhat positive'). This did not differ significantly by gender and while STEM students score higher here, they did so by just eight percentage points (65% vs. 57%).

Figure 9: Attitudes to Science Subjects in Primary School



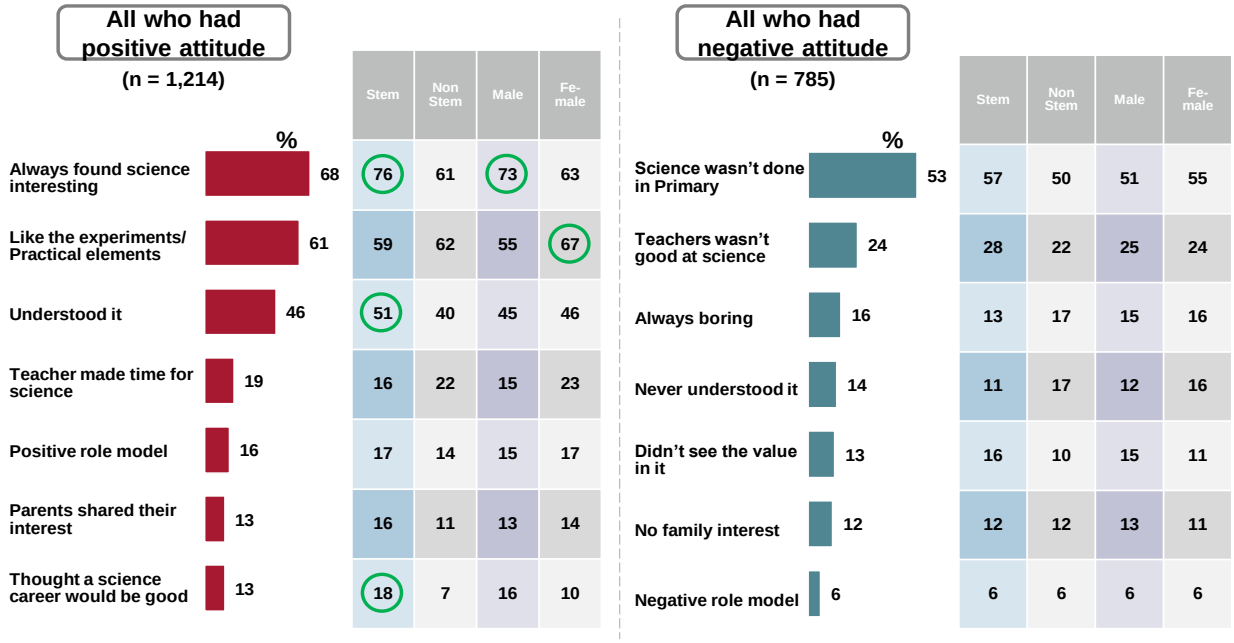
	STEM Students	Non STEM Students
Positive	65%	57%
Negatives	8%	12%

Of those who stated they had a positive attitude (n = 1,214), 68% said they always liked Science and found it interesting, over-indexing for STEM students (76%) and males (73%). Within the classroom, 61% of students liked experiments and practical elements of science; this was higher among females (67%). Among those who had a negative attitude towards science in primary school (n = 785), over half (53%) stated that science wasn't taught at all in primary school (reflecting the point made earlier regarding the full arrival of science in the primary curriculum in 2003). 24% of

students with negative attitudes stated that their teacher at primary level wasn't good at science leading to a negative attitude towards the subject.

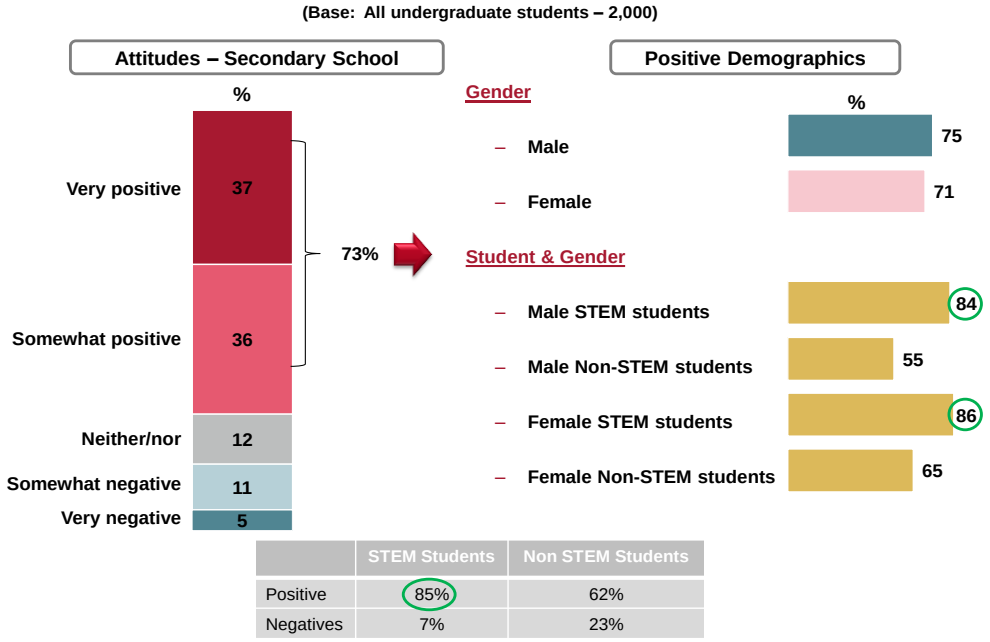
Further details of all the positive and negative attitudes are detailed in Figure 10 below.

Figure 10: Reasons for Positive/Negative Attitude towards Science in Primary School.



The same questions were asked of respondents in relation to their attitudes towards science at second level. As illustrated in figure 11 overleaf, 73% of students had a positive attitude to Science in secondary school. The gap between STEM and Non-STEM students attitudes widen here significantly in comparison to attitudes held in primary school (85% vs. 62%). Males (75%) also tended to be more slightly more positive towards science than females (71%).

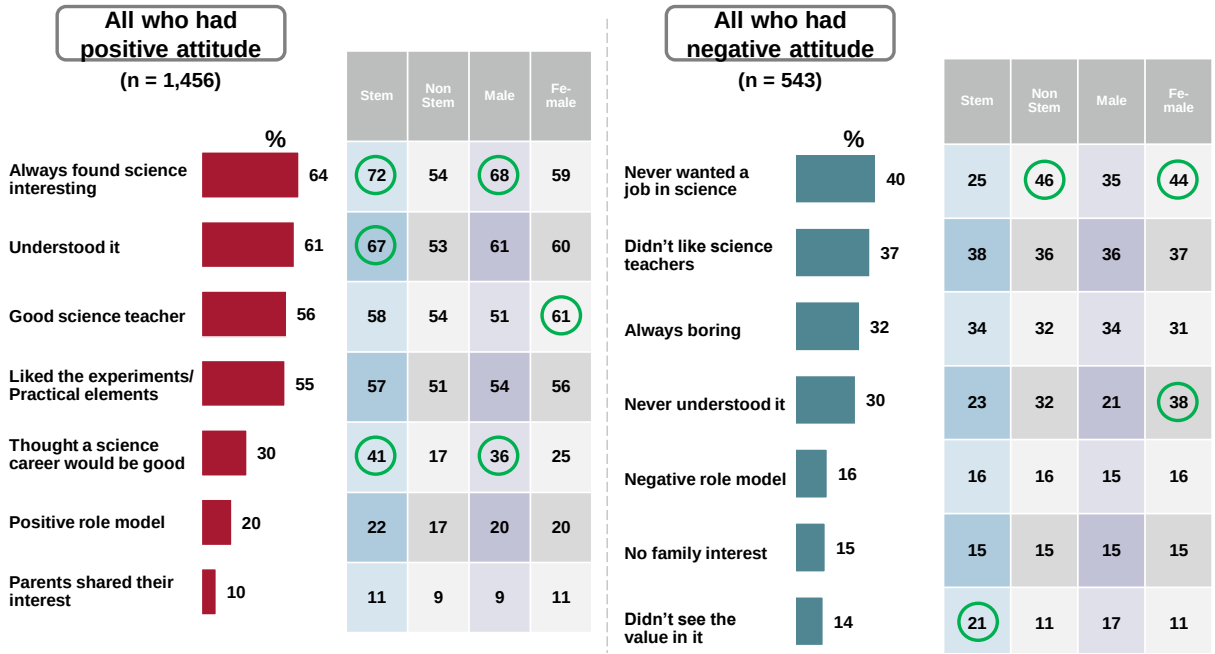
Figure 11: Attitudes towards Science Subjects in Secondary School.



	STEM Students	Non STEM Students
Positive	85%	62%
Negatives	7%	23%

As can be seen in figure 12, STEM students (72%) and males (68%) were more likely to say they always found science interesting, similar to primary school attitudes. STEM students were also more likely to say that they had a positive attitude towards science because they understood it (67%). Again, males and STEM students felt at that age that a career in science would be a good fit for them (36% and 41% respectively).

Figure 12: Reasons for Positive/Negative Attitudes towards Science in Secondary School.



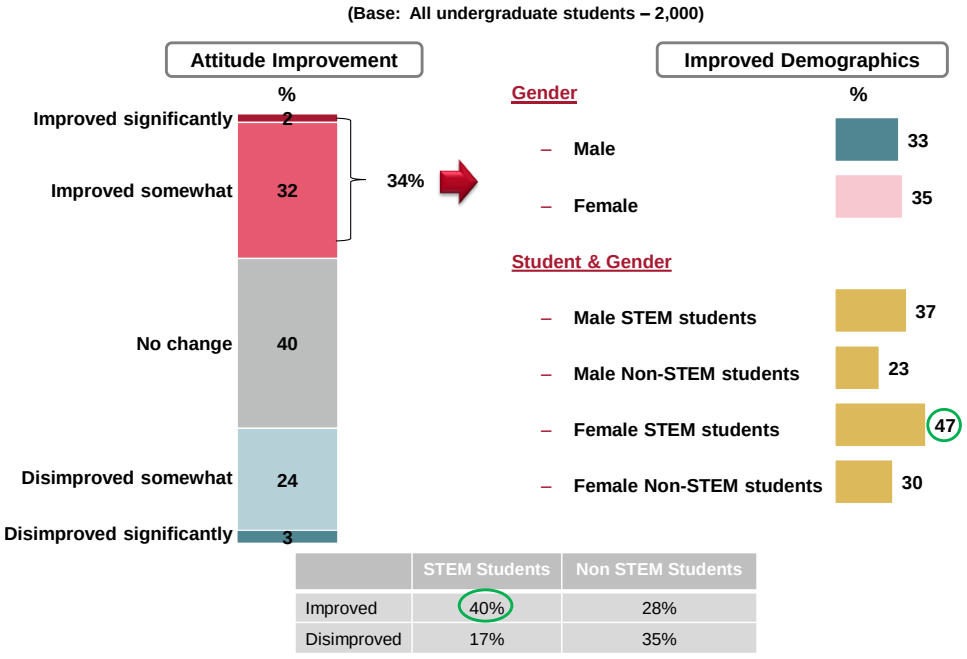
	Stem	Non Stem	Male	Fe-male
Always found science interesting	72	54	68	59
Understood it	67	53	61	60
Good science teacher	58	54	51	61
Liked the experiments/ Practical elements	57	51	54	56
Thought a science career would be good	41	17	36	25
Positive role model	22	17	20	20
Parents shared their interest	11	9	9	11

	Stem	Non Stem	Male	Fe-male
Never wanted a job in science	25	46	35	44
Didn't like science teachers	38	36	36	37
Always boring	34	32	34	31
Never understood it	23	32	21	38
Negative role model	16	16	15	16
No family interest	15	15	15	15
Didn't see the value in it	21	11	17	11

Of those who had a negative attitude (n = 543), 40% said they never wanted a job in science. Findings indicate that the role of the teacher is important in determining a positive or negative attitude towards science; 37% of those with a negative attitude were put off it because they did not like their science teachers, relative to 56% of students with a positive attitude who said this was due to a good science teacher. 38% of female students stated the reason for having a negative attitude towards the subject was because they never understood it, in comparison to only 21% of males.

With further analysis it was possible to determine how attitudes towards science between primary and secondary school changed. Illustrated in Figure 10 overleaf, it appears attitudes towards science improved for over a third of students (34%), while it disimproved for over a quarter (27%). Students who say their attitudes towards science subjects improved between primary and secondary school were more likely to go on to pick a STEM related course in college (22% of STEM students versus just 9% of non-STEM students). While a positive attitude at primary/secondary level is important, maintaining / improving that attitude is essential to putting students on the path to selecting a STEM course in college.

Figure 13: Primary School Attitudes versus Secondary School Attitudes towards Science.



	STEM Students	Non STEM Students
Improved	40%	28%
Disimproved	17%	35%

The largest improvements scores can be seen across the following groups:

- 47% of Female non-STEM students said their attitudes improved (17% disimproved)
- 47% of Science students said their attitudes improved (11% disimproved)

- 46% of Health students said their attitudes improved (12% disimproved)

While the move from primary school to secondary was also positive for Engineering students (39% improved; 12% disimproved), it was noticeably less so for Computer Science students (27% improved; 22% disimproved) indicating that attitudes towards science play less of a role for these students.

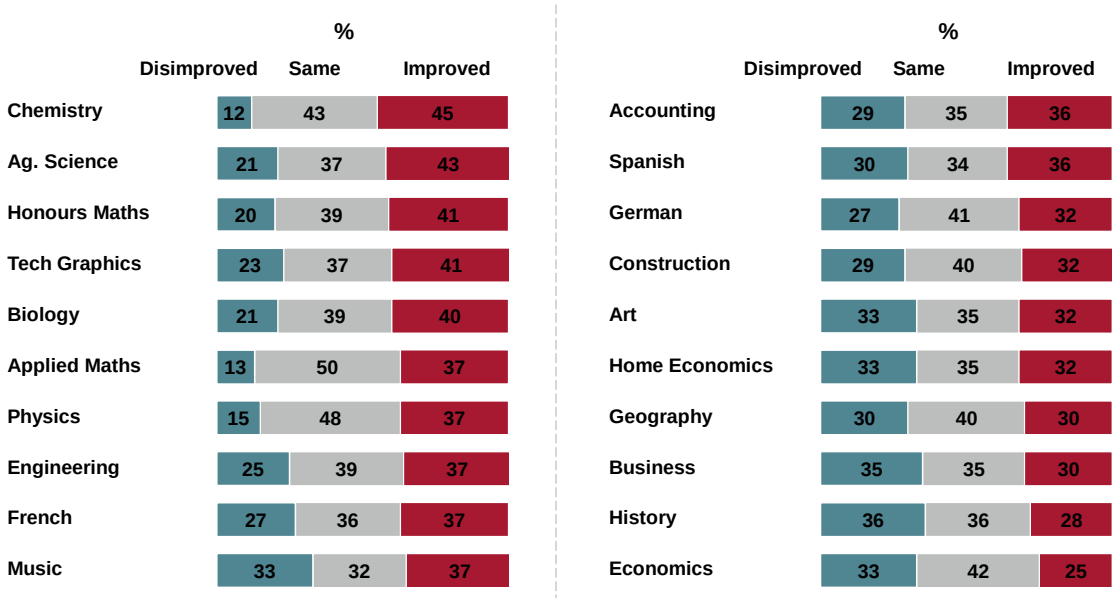
The exact opposite can be said for students in non-STEM courses, nearly all of whom were more likely to say their attitudes disimproved than improved:

- Arts (23% improved; 42% disimproved)
- Law (25% improved; 38% disimproved)
- Business (25% improved; 33% disimproved)
- Social Science/Psychology (27% improved; 34% disimproved)
- Social Work (31% improved; 30% disimproved)

Knowing that this transition period is so important, further analysis was conducted to assess the impact of Leaving Certificate subject choice. What becomes immediately apparent from Figure 14 below is that students who complete Science, Technology and Engineering subjects (and Higher Level Maths) during the senior cycle are more likely to say their attitudes towards STEM improved as a result.

Figure 14: Characteristics of Students in Respondents' Courses.

(Base: All undergraduate students – 2,000)



3.5 Attitudes towards STEM in Secondary School

In order to determine whether or not subject availability and choice at secondary school impacts on college course selection, students were asked to identify the subjects offered to them for the Leaving Certificate. Recognising that English, Irish and Ordinary Level Maths are available to all students, the survey found that 13 subjects were available to over half of third level undergraduates. The subjects most widely open to students were Biology (offered to 83%); French (82%); Geography (80%); and History (76%). Alternatively, Technology & Computing was available to 10% of students, Classics to 5% and Italian was only offered to 4% (others still were offered to 1% or less of Irish students during secondary school).

Outside of the core science subjects (Physics, Chemistry and Biology) and higher level Maths, over half of third level graduates for the Leaving Certificate state that no other science, technology or engineering subjects were available to them. Technical Graphics for example was offered as an option to 43% of students during secondary school for the senior cycle (these students were more likely to be male and to have chosen a STEM course in college).

There were notable differences in the mix of subjects offered to males and females, as well as differences in the subjects accessible to students who went on to study either STEM or non-STEM courses at third level.

Figure 15: Subjects Available for Leaving Certificate in Secondary School?

(Base: All undergraduate students – 2,000)

	Available %	Stem	Non Stem	Male	Fe-male
Biology	83	82	85	79	87
French	82	81	83	79	85
Geography	80	79	82	79	85
History	76	73	78	73	78
Business	75	72	77	71	79
Honours Maths	75	75	74	73	77
Chemistry	74	75	74	72	77
Art	69	64	74	61	78
Physics	68	73	64	71	65
Home Ec.	62	54	68	42	81
Accounting	61	61	62	60	63
Music	58	54	62	60	63

	Available %	Stem	Non Stem	Male	Fe-male
German	56	53	58	51	60
Tech Graphics	43	49	38	52	35
Construction	42	48	37	54	31
Economics	39	40	37	42	35
Ag. Science	37	39	36	40	34
Applied Maths	34	36	33	41	28
Religion	27	25	30	24	31
Engineering	25	29	21	31	18
Spanish	18	17	19	16	20
Technology/ Computing	10	9	10	11	8
Classics	5	5	5	6	4
Italian*	4	4	4	3	4

As can be seen in Figure 15, female students were more likely to have subjects such as Biology (87%), Geography (85%), Business (79%), Art (78%), and Home Economics (81%) made available to them. Males on the other hand were more likely to be given Technical Graphics (52%), Construction Studies (54%), Applied Maths (41%), and Engineering (31%) as options. The gaps for some of these subjects are quite significant with females almost twice as likely to be offered Home Economics (82% vs. 41%) while 31% of males were offered Engineering versus just 18% of females.

It should be noted that STEM and non-STEM students were as likely to be offered subjects such as Biology, Chemistry, and Honours Maths. However there were a number of gaps identified. For example, 73% of STEM students report that Physics was an option for them at Leaving Cert level while it was available to 64% of non-STEM students. Similar disparities can be seen for:

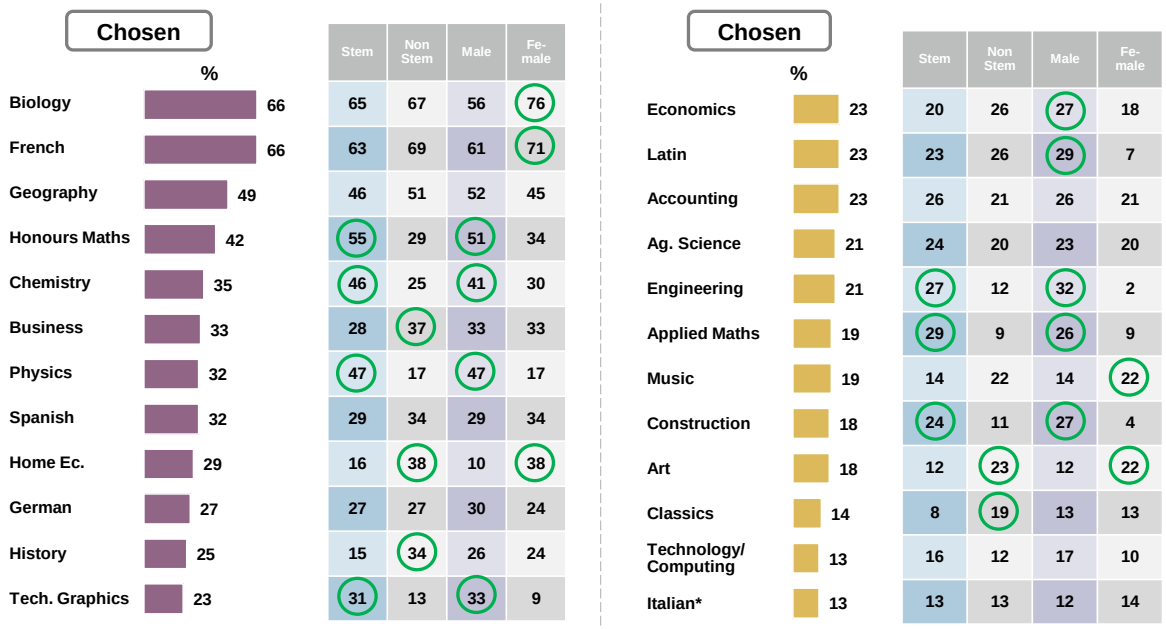
- Technical Graphics (49% STEM vs. 38% non-STEM)
- Construction Studies (48% vs. 37%)
- Engineering (29% vs. 21%)

On a whole, a pattern emerged that suggests the availability of Science, Technology, and Engineering subjects or Non-STEM senior cycle subjects is an underlying driver of third level course choice. The availability of subjects can be influenced by school size, available teacher to student ratio and a sufficient level of demand for a subject before it can be provided. Parents and students have a role to play in expressing this demand.

Unsurprisingly, the pattern above was mirrored such that students who chose Science, Technology, or Engineering subjects for Leaving Cert were more likely to choose a STEM course in college. This is based on the percentage figures for those where the subject was available, e.g. 83% of students said Biology was an option for them (1,666 respondents), of these, 66% (1,101 respondents) said they completed Biology for the Leaving Cert.

Figure 16: Subjects Chosen for Leaving Cert as Percentage of Available

(Base: All who did Leaving Cert in Ireland – 1,816)



Exploring this in more detail, we can see that students who completed the following subjects were more likely to go onto a STEM course at third level:

- Honours Maths (55% STEM vs. 29% non-STEM)
- Chemistry (46% vs. 25%)
- Physics (47% vs. 17%)
- Technical Graphics (31% vs. 13%)
- Engineering (27% vs. 12%)
- Applied Maths (29% vs. 9%)
- Construction Studies (24% vs. 11%)

The same can be said for the gap between male and female students, although males were also more likely to choose Economics (27%) and Latin (29%) than females (18% and 7% respectively).

These findings were however to be expected to a degree because of the research sample, whereby STEM students are more likely to be male than female. Taking a more in-depth perspective on this, subject choice could be reviewed by student type (i.e. Science, Technology, and Engineering students and non-STEM students) and gender together. This analysis indicates that regardless of gender, those who complete STEM subjects at Leaving Cert level are much more likely to choose a STEM course at third level:

- Male STEM students are much more likely to choose STEM subjects than Male non-STEM students
    - Honours Maths (58% Male STEM vs. 34% Male non-STEM)
    - Chemistry (46% vs. 31%)
    - Physics (55% vs. 31%)
    - Technical Graphics (37% vs. 23%)
    - Engineering (33% vs. 26%)
    - Applied Maths (33% vs.11%)
    - Construction Studies (29% vs. 21%)

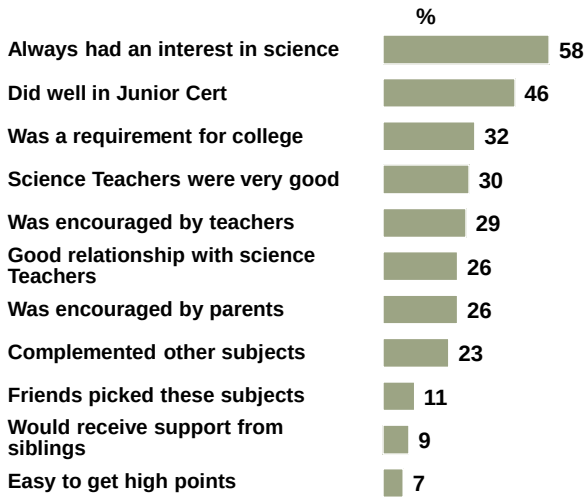
The same is true for females when it comes to Honours Maths, Chemistry, and Physics (i.e. Female third-level STEM students are much more likely to have picked them than their non-STEM counterparts). However, the findings are not as clear cut when it comes to Engineering, Applied Maths, and Construction Studies choice among females. The gaps here are not as significant although this may be the result of small sample sizes as few females said these options were available to them.

All in all, these findings highlight a strong link between the subjects chosen at Leaving Cert level and college course selection. Secondary school students (male or female) who choose Science, Technology, Engineering subjects or Higher Level Maths for their senior cycle are more likely to choose a STEM related course in college. This is obviously dependent on those subjects being available to them.

In order to further understand the factors which impact on Leaving Certificate subject course selection, we asked students about the main drivers influencing their choice of science subjects. The majority indicated that they have always had an interest in science (58%) while many also said they did well in the Junior Certificate in these areas (46%). Perhaps not surprisingly, students who were completing a STEM related course in college were much more likely to say they always had an interest in science (76%).

Figure 17: Reasons for Picking STEM Subjects in Secondary School

(Base: All who choose STEM subject for leaving cert – 1,664)



	Stem	Non Stem	Male	Female
Always had an interest in science	76	40	63	53
Did well in Junior Cert	48	43	44	47
Was a requirement for college	44	19	33	31
Science Teachers were very good	32	28	29	31
Was encouraged by teachers	27	31	23	34
Good relationship with science Teachers	30	23	28	24
Was encouraged by parents	25	27	22	30
Complemented other subjects	27	19	25	20
Friends picked these subjects	10	11	11	10
Would receive support from siblings	10	7	8	9
Easy to get high points	5	9	8	7

Looking through these data, we can also see that just 29% said they were encouraged to pick STEM subjects for the Leaving Cert by their teachers while 26% were encouraged to do so by their parents. This did not differ for STEM and non-STEM students but interestingly female students were more likely to say their parents encouraged them to pick a STEM course than their male counterparts (30% vs. 22% respectively).

3.6 Engagement with STEM Events

The next factor the questionnaire aimed to explore related to undergraduates' exposure to STEM events. At an overall level, just over half (52%) of undergraduates say they have attended a Science Week event (higher among STEM students – 59%), almost half (45%) attended a School talk (STEM students – 56%), while over a third (37%) have visited a STEM website (53% of STEM students). Based on this, it would be easy to suggest there is a causal link between these activities, i.e. that attending these events makes you more likely to become a STEM student, although the opposite could equally be true, i.e. that those who are likely to become a STEM student attend these events – overall it is more than likely a mix of these as events both encourage and strengthen students' attitudes towards STEM courses.

At an overall level, 28% of undergraduate students have not attended any STEM event. 38% of non-STEM students fall into this category further highlighting the relationship between attendance and engagement with STEM events and college course choice. At the other end of the spectrum, STEM students are more than twice as likely to have engaged with 3 or more of the below (39% versus 18% for non-STEM students).

Figure 18: Attendance at STEM Events.

(Base: All undergraduate students – 2,000)

	Total	STEM Students	Non-STEM students	Male	Female	Dublin	ROL	Munster	Conn/ Ulster	Outside Ireland
	%	%	%	%	%	%	%	%	%	%
Science week	52	59	44	52	51	51	51	51	57	49
Attended talk at school	45	56	34	48	41	46	46	43	47	50
Visited a STEM website	37	53	22	46	28	38	39	36	38	28
STEM exhibition (e.g. BT Young Scientist)	20	22	18	20	20	20	20	19	20	24
STEM school club	17	22	12	21	12	21	19	16	14	21

Having attended a STEM event, respondents were asked to rate their experience on a scale of 1 to 5, from very negative to very positive. These events were typically well received by both STEM and non-STEM students. STEM exhibitions such as the BT Young Scientist perform best as over four in five (82%) said the experience was

positive. 67% of students who used STEM websites said they provided a positive experience. While this falls behind the other mediums, STEM websites offer a far greater reach and are accessed in a completely different way to the other methods described above.

It is interesting to note that, apart from school talks and STEM clubs (e.g. chess, coderDojo etc.), STEM events were as well received by non-STEM students. Encouraging all students to attend Science Week, Science Exhibitions, and STEM websites in their current format is likely to yield positive results in terms of attitudes to STEM although the current format of school talks and clubs seem particularly geared towards those with an inherent positive attitude towards STEM already.

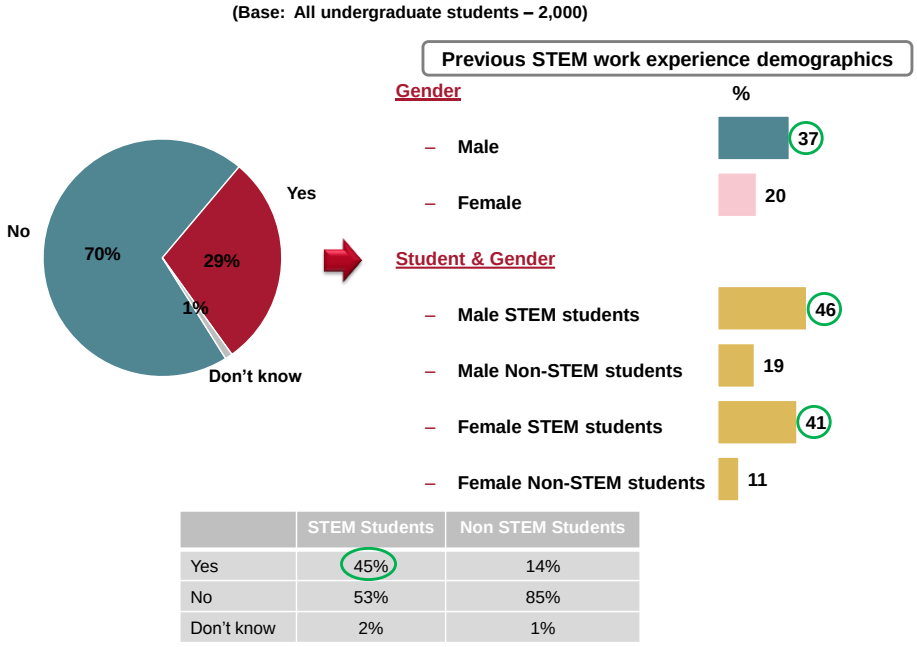
Figure 19: Experience of STEM Events.

(Base: All undergraduate students – 2,000)

	Stem	Non Stem	Male	Female
Science week (n=1,031)	79	76	76	79
Attended talk at school (n=891)	83	66	77	75
Visited a STEM website (n=734)	68	67	66	71
STEM exhibition (n=401)	82	80	79	83
STEM school club (n=336)	78	67	71	68

Looking beyond STEM events, we also tested to see if STEM-related work experience had any impact on likelihood to become a STEM student. Almost three in ten (29%) Irish undergraduate students have completed some work experience in a STEM environment (this included working in a STEM office or workplace although not being involved directly with STEM activities, e.g. working at reception in a technology company).

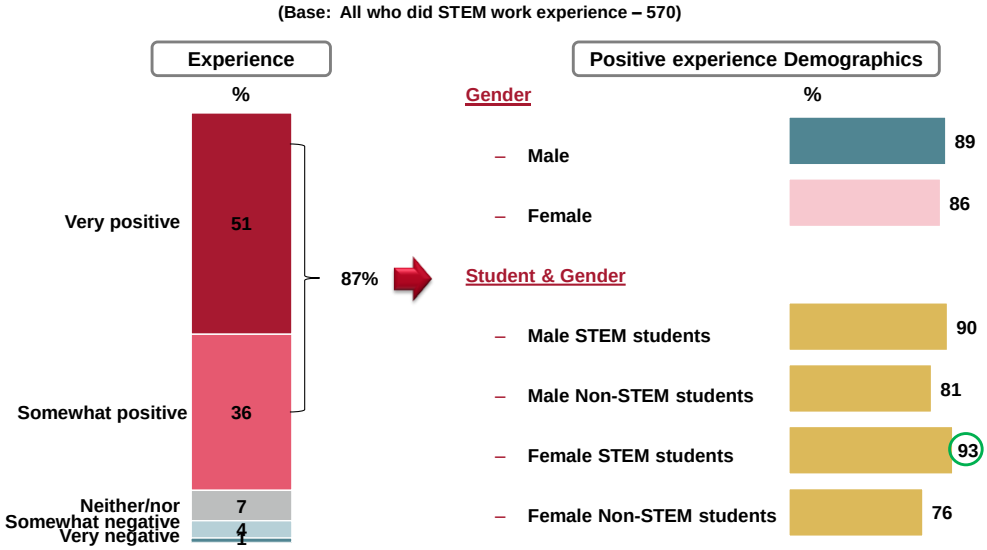
Figure 20: Previous Experience Working in STEM related Organisation.



	STEM Students	Non STEM Students
Yes	45%	14%
No	53%	85%
Don't know	2%	1%

STEM students are much more likely to have completed work experience in a STEM environment (45% versus 14% for non-STEM students). As we can see from Figure 21 below, they are also more likely to have rated that experience as positive. At an overall level, 87% of students who did some work experience in a STEM environment said it was positive, this climbs to 91% among STEM students but falls to 78% for non-STEM students – suggesting the experience may have been off-putting for some.

Figure 21: Reflection on STEM Work Experience.



	STEM Students	Non STEM Students
Positive	91%	78%
Negatives	4%	9%

3.7 Attitudes to STEM, Government and Wider Society

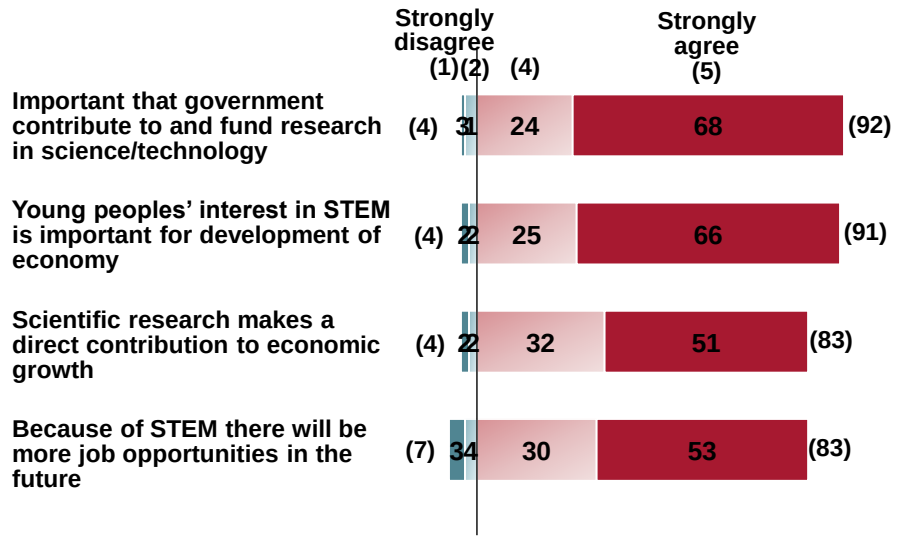
On a final note we asked students to reflect on their attitudes to STEM and its role in wider society as well as gauging their beliefs about the role Government should be playing to support STEM. From the responses we can see that students are clearly interested in the topic as they strongly agree with all statements put forward to them.

Overall, 92% of students agree that it is important that the government contributes to and funds research in science and technology. Similarly 91% agree that young peoples' interest in STEM is important for the development of the economy. Disagreement with these statements is very low at just 4% and agreement scores did not differ significantly between STEM and non-STEM students.

In addition, 83% of all students also agreed with the statements "Scientific research makes a direct contribution to the economic growth of the country" and "Because of science, technology, and engineering there will be more job opportunities in the future. STEM students were slightly more likely to agree with these statements (87%).

Figure 22: Subjects Chosen for Leaving Cert as Percentage of Available

(Base: All undergraduate students – 2,000)



	Stem	Non Stem	Male	Female
Important that government contribute to and fund research in science/technology	94	90	92	92
Young peoples' interest in STEM is important for development of economy	93	89	91	91
Scientific research makes a direct contribution to economic growth	87	81	85	92
Because of STEM there will be more job opportunities in the future	87	79	83	82

4.0 Discussion on Research Findings

It is clear from the findings above that there are a number of contributing factors to the journey third level students take in deciding on their college course. This section discusses the key points and attitudes which seem to drive decisions towards or away from STEM courses at third level.

1. The Feeling of Fitting In and Stereotypes Towards STEM Students

Undergraduate students say the most important factor when considering a course is the feeling that they will fit in (61%). The fact that this outweighed a number of functional factors (which colleges, institutes of technology, and guidance counsellors are likely to point to) and human factors (such as the role of parents and teachers) makes this finding quite significant. This finding highlights the important emotional aspects behind the decision to select a college course.

However, the research found that undergraduate students believe 'STEM' students as a group are more intelligent, career focussed and unsociable than their own classmates. These stereotypes even hold true for students who are currently completing a STEM course, e.g. 75% of STEM students think their classmates are intelligent, but 90% say 'STEM' students are intelligent.

While being perceived as intelligent and career focussed is not necessarily negative, the fact that they do not align with STEM students' own experiences suggests a misunderstanding of the typical STEM student. This incorrect perception may lead secondary school students to feel they will not fit in, pushing them towards other courses. It also discourages both students and parents from requesting that these courses be made available.

Ensuring access for students to real life career stories that demonstrate the diversity and range of careers and college choices available to them in STEM should be a priority to help breakdown stereotypical perceptions of the type of person who chooses STEM careers.

2. The Perceived Negative of STEM Courses

The perception that STEM courses are difficult seems to be somewhat of a double-edged sword; while it works to ensure that they are well received by employers, it also discourages students from considering STEM courses originally. While this attitude is not completely inaccurate (43% of STEM students say STEM courses are difficult) there is an imbalance, as close to six in ten (59%) non-STEM students believe this to be the case. This attitude is held equally among the different non-STEM students, e.g. Law students (57%) and Arts students (62%), suggesting it is not driven by the level of points the respondent achieved in the Leaving Certificate.

Moving beyond this, the other key perceived barrier to choosing a STEM course is the belief that there are too many hours per week (48%), a sentiment linked to the perception that they offer a poor social life (35%). The differences between STEM and non-STEM attitudes on these metrics are relatively similar suggesting that this is the reality for large groups of students and a real barrier for others. While STEM students seem willing to trade this for the prospect of a good job further down the line, it is discouraging others from choosing this route.

3. Attitudes towards science in Primary/Secondary School

Another important finding relates to students' attitudes towards science, technology and engineering subjects at primary and secondary level. Students who say their attitudes towards these subjects improved between primary and secondary school were much more likely to choose a STEM course in college. Further analysis found that Leaving Certificate subject selection plays an important underlying role here as those who complete Science, Technology and Engineering subjects for the Leaving Certificate are much more likely to say their attitudes improved in secondary school.

The full embedding of the primary schools science curriculum is likely to have addressed this issue to a degree already although encouraging students to select STEM subjects for the Leaving Certificate, by addressing incorrect stereotypes and beliefs, is likely to build on this further.

4. The Availability of STEM Subjects at Leaving Certificate Level

It is evident from the research that the availability of Science, Technology and Engineering subjects in post primary school is an important factor influencing STEM college course selection. Students who had access to Physics, Technical Graphics, Engineering or Applied Maths were all much more likely to select a STEM course at third level.

Similarly, those who completed Honours Maths, Chemistry, Physics, Technical Graphics, Engineering, or Applied Maths (when available to them) were much more likely to continue on to a STEM course. It is important to recognise that the availability of subjects is dependent on a number of factors including school size and the demand for the subject. Considering these factors and the findings from this research it is important that parents and students are aware of the role they play in demonstrating this demand. Ensuring students have the option to complete a Science, Technology, and Engineering subject at Leaving Cert Level should be a priority.

5. The Importance of STEM Events

Finally the research highlighted the important role that STEM events and work experience can play. 83% of STEM students attended at least one STEM event (e.g. Science Week, STEM related school talk, visited a STEM website, STEM exhibition, or taken part in a STEM school club) versus just 68% of non-STEM students. These events are typically well received by students (STEM and non-STEM) so they should be encouraged at primary and secondary school level. While students were unlikely to say career talks contributed considerably to their course selection, they may act as a route to alter stereotypes held towards STEM students which can help them feel that they would fit in.

Being given the opportunity to do work experience in a STEM environment also contributes positively. 45% of STEM students were likely to have done so at some stage versus just 14% of non-STEM students. Encouraging STEM businesses to take on more work experience students will give more of them the opportunity to experience this first hand.

Appendices

Appendix 1: Questionnaire

S13-344

amárachresearch
Science Foundation Ireland
STEM Research

Many thanks for opting to take part in this research. This research is being conducted on behalf of a Government Agency and should take no longer than 6-7 minutes to complete as there are only 25 questions. This research aims to gain a greater understanding of your attitudes towards your current course and your reasons for selecting it. All responses are treated in confidence and remain anonymous in accordance with ESOMAR and MRS data standards; only overall aggregated data will be used for analysis.

Section 1: Demographics

There are four sections in the questionnaire. In this section we would like you to provide information on your college and course.

Ask all

Q.1 Are you currently enrolled in a third level university/college/institute of technology in the republic of Ireland?

Yes	1	**Continue**
No	2	**Thank & close**

Ask all

Q.2 Which university/college/institute of technology are you currently enrolled in?

Athlone IT	01	National University of Ireland Galw (NUIG)	06
Carlow IT	02	Tipperary IT	07
Dublin City University (DCU)	03	Sligo IT	08
Dundalk IT	04	University College Cork	09
IT Tallaght	05	University College Dublin	10
		Other (Please specify _____)	**11 close**

Ask all

Q.3 Are you currently completing an undergraduate or post-graduate course?

Undergraduate course	1	**Continue**
Postgraduate course	2	**Close**

Ask all

Q.4 Which of the following categories most closely describes your current area of study?

Education/Teaching formal sector	1	Health (medicine, nursing, pharmacy etc	10
Education non-formal sector	2	Science	11
Business (e.g. commerce, finance)	3	Engineering/Architecture	12
Languages	4	Animal studies (Veterinary, zoology etc.)	13
History/Cultural studies	5	Food and Nutritional studies	14
Social Sciences/Psychology	6	Services (hotel, travel, hair and beauty e	15
Computer Sciences	7	Social work/childcare	16
Media/production	8	Arts	17
Law	9	Other (Please specify_____	97

Ask all except Q4 code 7 (force into code 2), code 11 (force into code 1), code 12 (force into code 3).

Q.5 Is your course related to a Science, Technology, Engineering or Maths (STEM) subject?

Yes – it is a Science course	01
Yes – it is a Technology course	02
Yes – it is an Engineering/Architecture course	03
Yes – it is a Mathematics course (this also includes finance/statistics)	04
No – it is not a STEM course	05
Don't know	99

SECTION 2 – Secondary School

In this section we would like to ask you about the subjects available in your Secondary School and those that you chose.

Ask all

Q.6 During secondary school, what subject choices were you offered for the Leaving Cert?
(These exclude English, Irish and ordinary Maths. Please select all that apply).

Accounting	01	Engineering	14
Agricultural Science	02	French	15
Agricultural Economics	03	Geography	16
Ancient Greek	04	German	17
Applied Mathematics	05	Honours Maths	18
Art	06	History	19
Biology	07	Home Economics	20
Business Studies	08	Italian	21
Chemistry	09	Latin	22
Classical Studies	10	Music	23
Construction Studies	11	Physics	24
Design & Communication (Tech) Graphics	12	Religious Education	25
Economics	13	Technology /Computing	26
		Other (Please Specify)	97

Ask all – Show those mentioned at Q5a

Q.7 What subjects did you complete as part of your Leaving Cert?
(These exclude English, Irish and ordinary Maths. Please select all that apply).

Accounting	01	Engineering	14
Agricultural Science	02	French	15
Agricultural Economics	03	Geography	16
Ancient Greek	04	German	17
Applied Mathematics	05	Honours Maths	18
Art	06	History	19
Biology	07	Home Economics	20
Business Studies	08	Italian	21
Chemistry	09	Latin	22
Classical Studies	10	Music	23
Construction Studies	11	Physics	24
Design & Communication (Tech) Graphics	12	Religious Education	25
Economics	13	Technology /Computing	26
		Other (Please Specify)	97

Ask all who chose one or more science, technology, engineering, maths subject

(Q7 code 2, 5, 7, 9, 10, 11, 12, 14, 18, 24) – Rotate (MC)

Q.8 Why did you choose these science, technology, engineering, maths subjects?
(Please select all that apply and feel free to provide additional comments in the 'other' section)

Always had an interest in science	01
Did well in science at Junior Cert level	02
Was encouraged to pick science subjects by parents/guardians	03
Was encouraged to pick science subjects by teachers/guidance counsellor	04
Heard it was easy to get high points in these subjects	05
Complemented my other selected subjects	06
Science teachers in my school were very good	07
Had a good relationship with science teachers in my school	08
Was a requirement for my college course	09
One or more of my friends picked these subjects	10
Knew I would receive support from older sibling/parent in these subjects	11
Other (Please specify)	97

Ask all who did not choose any science, technology, engineering, maths subject where they were available
(Q7 not 2, 5, 7, 9, 10, 11, 12, 14, 18, 24) – Rotate (MC)

Q.9 Why did you not choose any science, technology, engineering, maths subjects?

(Please select all that apply and feel free to provide additional comments in the 'other' section)

Never had an interest in science	01
Did poorly in science at Junior Cert level	02
Was discouraged to pick science subjects by parents/guardians	03
Was discouraged to pick science subjects by teachers/guidance counsellor	04
Heard it was difficult to get high points in these subjects	05
Did not complement my other selected subjects	06
Science teachers in my school were very poor	07
Had a poor relationship with science teachers in my school	08
My school did not offer the science subject I wanted	09
None of my friends picked these subjects	10
Did not think I would receive support from older sibling/parent in these subjects	11
Other (Please specify)	97

SECTION 3 – College Course

In this section we would like to ask about your college and course selection.

Ask all – Rotate (MC)

Q.10 Who or what influenced your decision to choose your current course?

(Please indicate your top three influences)

	1st	2nd	3rd
My parents	01	01	01
My guidance councillor/ teachers at school	02	02	02
My friends	03	03	03
Location of College (e.g., close to public transport or city centre)	04	04	04
Close to home	05	05	05
Academic reputation	06	06	06
Suitable entry requirements	07	07	07
All my friends were going	08	08	08
Sports/society reputation	09	09	09
Social life reputation	10	10	10
Career Prospects	11	11	11
I felt I would fit in to this course	12	12	12
Previous work experience	13	13	13
A famous person/role model	14	14	14
A careers talk at school	15	15	15
Other (Please specify)	97	97	97

Ask all – Rotate (MC)

Q.11 How did your parents/guardians advise you when you picked your current course?
(Please select all that apply)

Said it would be suited to my personality	01
Said it would be suited to my capability	02
Advised based on college proximity	03
Advised based on college reputation	04
Said there are jobs in this sector	05
Interesting subjects	06
Well perceived by employers	07
Other (Please specify)	97

Ask all

Q.12 How confident are you that you will be able to find a job/occupation you will enjoy after your studies?
(Please select one answer)

Not at all confident	Lacking confidence	Neither/Nor	Somewhat confident	Very Confident
01	02	03	04	05

Section 4 – Attitudes towards STEM courses and careers

This is the second last section. This section looks at your opinions on Science, Technology, Engineering and Maths subjects.

Ask all

Q.13 What would you say your attitude towards science was in **a)** primary school **b)** secondary school? *(Please indicate your answers on a scale from 1 to 5, 1 represents very negative, 5 represents very positive.)*

a). Primary school

Very Negative	Somewhat Negative	Neither positive nor negative	Somewhat Positive	Very Positive
01	02	03	04	05

b). Secondary school

Very Negative	Somewhat Negative	Neither positive nor negative	Somewhat Positive	Very Positive
01	02	03	04	05

Ask all - Rotate

Q.14 You said you had a Positive or Negative/Neutral *<Insert answer from Q.12a>* attitude towards science in primary school. Why was that?
(Please select all that apply)

Positive – codes 4-5 at Q12a	
I had a positive role model -someone involved in science who made it interesting/attractive	01
I always found science interesting	02
My parents shared their interest in science	03
My teacher was good at teaching science	04
My teacher regularly made time for science lessons	05
I understood it	06
I liked the experiments and practical aspect of science	07
I thought that a career in science would be a good option	08
Other (Please specify)	97
Negative/Neutral – codes 1-3 at Q12a	
I had a negative role model -someone involved in science who made it uninteresting/unattractive	01
I never understood science	02
I didn't see the value in science subjects	03
My teacher wasn't good at teaching science	04
Science was not done in my primary school	05
I knew I would never want a job in science	06
Nobody in my family ever had an interest in science	07
It was always boring	08
Other (please specify)	97

Ask all - Rotate

Q.15 You said you had a Positive or Negative/Neutral *<Insert answer from Q.13b>* attitude towards science in secondary school. Why was that?
(Please select all that apply)

Positive – codes 4-5 at Q12b	
I had a positive role model -someone involved in science who made it interesting/attractive	01
I always found science interesting	02
My parents shared their interest in science	03
I had a good science teacher	04
I understood it	05
I liked the experiments and practical aspect of science	06
I thought that a career in science would be a good option	07
Other (Please specify)	97
Negative/Neutral – codes 1-3 at Q12b	
I had a negative role model -someone involved in science who made it uninteresting/unattractive	01
I never understood science	02
I didn't see the value in science subjects	03
I didn't like my science teachers	04
I knew I would never want a job in science	05
Nobody in my family ever had an interest in science	06
It was always boring	07
Other (please specify)	97

Ask all – Rotate (Choose three)

Q.16 What three characteristics would you associate with the typical student in your course? *(Please indicate the top three characteristics you associate with your fellow students)*

Sociable	01
Career focused	02
Intelligent	03
Confident	04
Positive outlook	05
Unsociable	06
Unintelligent	07
Lazy	08
Negative outlook	09
Lacking confidence	10
Other (Please specify)	97

Ask all – Rotate (Choose three)

Q.17 And what three characteristics would you associate with a student studying a Science, Technology, Engineering or Maths (STEM) course? *(Please indicate the top three characteristics you associate with STEM students)*

Sociable	01
Career focused	02
Intelligent	03
Confident	04
Positive outlook	05
Unsociable	06
Unintelligent	07
Lazy	08
Negative outlook	09
Lacking confidence	10
Other (Please specify)	97

Ask all – Rotate (Choose three)

Q.18 Which of the following do you see as the main positives for choosing a STEM course? *(Please indicate your **top three** positives)*

	1st	2nd	3rd
Innovative courses	01	01	01
Good job prospects	02	02	02
Good earning potential	03	03	03
Stretch students intellectually	04	04	04
Learn critical thinking skills	05	05	05
Good social life	06	06	06
Interesting subjects	07	07	07
Well perceived by employers	08	08	08
Opportunities to work/travel abroad	09	09	09
Lecturers are approachable and supportive	10	10	10
STEM lecturers/tutors are supportive	11	11	11
Good facilities (e.g. labs, computer rooms, etc.)	12	12	12
Leads to a fulfilling career	13	13	13
Allows me to follow my passion	14	14	14
Includes a work placement	15	15	15
Other (Please specify)	97	97	97

Ask all – Rotate (Choose three)

Q.19 Which of the following do you see as the main negatives for choosing a STEM course? *(Please indicate your **top three** negatives)*

	1st	2nd	3rd
Old fashioned courses	01	02	03
Poor job prospects	01	02	03
Poor earning potential	01	02	03
Poor social life	01	02	03
Subjects are too difficult	01	02	03
Other students are not like me	01	02	03
Too many hours per week	01	02	03
Poorly perceived by employers	01	02	03
No opportunities to work/travel abroad	01	02	03
Lecturers are not approachable and supportive	01	02	03
STEM lecturers/tutors are supportive	01	02	03
Poor facilities (e.g. labs, computer rooms, etc.)	01	02	03
Does not lead to a fulfilling career	01	02	03
Does not include a work placement	01	02	03
Other (Please specify)	01	02	03

SECTION 5

This section looks at your awareness and engagement with Science events.

Ask all

Q.20 Have you ever heard of any of the following science events/programmes?

	Yes	No
Science Week	01	02
BT Young Scientist	01	02
Engineers Week	01	02
Maths Week	01	02
Smart Futures	01	02
Science Foundation Ireland	01	02
SciFest	01	02
Science/Engineer Talk at your School	01	02
Science/Engineering Career Seminar	01	02

Ask all

Q.21 Of the science events/programmes you are aware of, have you ever attended/taken part in any of the following?

	Yes	No
Attended a science, engineering, or maths event (e.g. Science Week)	01	02
Attended a careers talk or visit from a scientist or engineer in your school	01	02
Visited websites relating to Irish Science, Technology, Engineering or Maths programmes (e.g. Science week, Smart Futures, STEPS)	01	02
Involved in any school related Science, Technology, Engineering or Maths clubs (e.g. Coder Dojo, CTYI)	01	02
Participated in Science, Technology, Engineering, or Maths exhibition or fair (e.g. BT Young Scientist/SciFest)	01	02

Ask for all events attended – repeat for those selected at Q21

Q.22 You mentioned that you attended <insert code from Q23a> how would you rate your experience? *(On a scale of 1 to 5 where 1 is 'Very Negative' and 5 is 'Very Positive – Please pick one answer).*

Very Negative	Somewhat Negative	Neither/Nor	Somewhat Positive	Very Positive
01	02	03	04	05

Ask all

Q.23 Have you ever had work experience of any kind in a Science, Technology, Engineering or Maths related organisation?

Yes	1
No	2
Don't Know	3

Ask all code 1 @Q.23

Q.24 You mentioned you had work experience in a Science, Technology, Engineering or Maths related organisation, please rate your experience from positive to negative.
(On a scale of 1 to 5 where 1 is 'Very Negative' and 5 is 'Very Positive – Please pick one answer).

Very Negative	Somewhat Negative	Neither/Nor	Somewhat Positive	Very Positive
01	02	03	04	05

Ask all

Q.25 Please indicate on a scale of 1 to 5 how strongly you agree or disagree with the list of statements below. *(On a scale of 1 to 5 where 1 is 'Strongly Disagree' and 5 is 'Strongly Agree' Please pick one answer for each statement).*

	Strongly Disagree	Somewhat Disagree	Neither/ Nor	Somewhat Agree	Strongly Disagree
It is important that the Government contribute to and fund research in science and technology in Ireland.	01	02	03	04	05
Young people's interest in science, engineering and technology is important for the development of our economy.	01	02	03	04	05
Scientific research makes a direct contribution to the economic growth of the country.	01	02	03	04	05
Because of science, technology and engineering there will be more job opportunities in the future.	01	02	03	04	05

Classification

This is the last section. There are just 4 questions about you.

Ask all

C.1 Are you….?

Male	1
Female	2
Other (please specify)	3

Ask all

C.2 What age are you?

Ask all

C.3 In which of these regions is your family home?

Dublin	1
Rest of Leinster (excluding Dublin)	2
Munster	3
Connaught	4
Ulster (ROI)	5
Northern Ireland	6
Outside Ireland	7

Ask all (MC)

C.4 Do your parents/guardians work in any of the following sectors?

	Yes	**No**
Science/health	01	01
Technology	02	02
Engineering/Architecture	03	03
Mathematics/Finance	04	04
Manufacturing	05	05
Legal/political	06	06
Art/ Design	07	07
Trade (e.g. carpenter, plumber, etc.)	08	08
Business	09	09
Marketing/Sales	10	10
Social care/charity	11	11
Public service	12	12
Education	13	13
Other (Please specify)	97	97
Don’t know	98	98

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